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THE UNIVERSITY OF ALBERTA

A Constant Market Share Analysis of Global Wheat Markets

by

William J. Schissel

(C)

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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IN

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled A Constant Market Share Analysis of Global Wheat Markets submitted by William Schissel in partial fulfillment of the requirements for the degree of Master of Science in Agricultural Economics.

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ABSTRACT

This study attempts to measure export market shares for the five major wheat exporting countries or regions of the world and to attribute their success or failure to certain factors, applying a constant market share model for this purpose. Specifically each exporting country's gain or loss of export market share is attributed to one of the following factors, the general increase in world trade, the type of commodity exported, the nature of the market into which the exports are entering and lastly, to exporting nations' competitiveness.

In employing the technique of constant market share analysis to attribute export performance to the above factors, wheats are classified into three types or categories for this analysis: hard, medium and soft. Importing countries are categorized as being industrialized, middle-income developing, less-developed, or centrally planned European countries.

The data for this study were gathered from four sources. U.S. data were obtained from the United States Department of Agriculture, Canadian data from the Canadian Grain Commission, Australian data from the Australian Wheat Board and E.E.C. and Argentine data from the International Wheat Council.

The results of the analysis seemed to confirm that Canada had been successful at marketing hard red spring wheat but that the growth in demand on a global basis appears to be for the lower protein wheats which have more diverse applications. Thus, there may be some justification to develop a marketing infrastructure that will accommodate and encourage production of both high protein wheats which seem to have a stable demand, and the lower protein, higher yielding wheats for which there appears to have been a positive growth rate.

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I. INTRODUCTION

Wheat has played a major role in the development of the Canadian economy, and has been especially significant in Western Canada. The grain production potential of the Canadian prairies was the stimulus for the settlement and cultivation of the prairie area in the late ninteenth and early twentieth centuries. The completion of the transcontinental railway was the final element that enabled institution of a "National Economic Policy"[1]

The prairie region was particularly well adapted to growing spring wheat and production expanded rapidly. With the help of a trans-continental rail system and lower cost ocean shipping, world markets for wheat were opened up to the prairie farmer. Between World War I and World War II wheat became Canada's most important export commodity and today it still plays a considerable role in Canada's trade balance, although it has been surpassed by non-agricultural commodities.[2] As western economies experienced rapid growth in the late nineteenth and early twentieth centuries, the demand for a stable wheat supply grew also. Canada's ability to supply these markets with a consistent, high-quality high-protein wheat was an important plus for her economy. During this period the agricultural sector performed well

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[1] The settlement of the Western prairies at the turn of the century provided the incentive for central Canadian industies to produce equipment and supplies needed to develop the new region. The prairies provided a consistent food supply as well as a ready market for manufactured goods. This mutually beneficial arrangement formed the basis for the "National Economic Policy."

[2] Pulp and paper, mining, oil and gas for example.

but more important, the whole economy progressed. However, in recent years world markets for wheat have changed and there has been some concern expressed that wheat marketing institutions in Canada have not kept abreast of changes and trends in the available mix of wheats for export.

Three factors which would substantiate this stand out; one is demand related, one is income related and a third is technology related. First, the demand for feed grains has been strong and is projected to continue to be stronger than for food grains on a worldwide basis, reflecting increased demand for meat and livestock products in a continually developing world, although in recent years, feed grain prices have declined because of substantial global surpluses. As is the case in most commodity cycles, the lower quality wheats suffer a greater decline than do the higher value wheats. Second, yield advantages of medium and lower quality wheats may have offset any price discount for these wheats; and third, technological advancements in the milling and baking industries have decreased the amounts of high quality wheats needed in the dough mix necessary to produce acceptable bakery goods.

A. Historical Perspectives

From the earliest days, Western Canada was recognized for its high quality wheat. The development and distribution of the early maturing hard red spring variety, Marquis, in

the first decade of the twentieth century,was a major step in establishing the reputation enjoyed by Canadian wheats in overseas markets. "Marquis" quality was and still is the quality standard which new varieties must meet in order to be licensed.[3] With rigid grade standards in place to ensure quality, western Canadian producers rapidly expanded production. Between World War I and World War II, Canada was the world's largest exporter of wheat (Wheat Advisory Committee, 1939). Canada has since relinquished this position to the U.S.A.,but remains as a producer and major exporter of high-quality, high-protein wheat.[4] This factor can be attributed in part to the development and maintenance of rigid grading standards which encourage the production of high quality, high protein bread wheat at the expense of increased yields.

At times in this century, notably during the World Wars and during the depression of the nineteen thirties, the United States of America was a net importer of wheat (Wheat Advisory Committee, 1939) During these periods Canada was able to supply the needs of her southern neighbor. After World War II, production of all grains expanded in the United States At this time, world wheat exports increased dramatically. The U.S.A. was able to capture a large share

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[3] For practical purposes of comparison, the varietal standard today is the variety Thatcher. It is a cross arising from Marquis and is of similar quality.

[4] Canadian and American hard red spring wheats are similar, however, Canadian wheat is historically of more consistent quality. Canada is the only major wheat exporting country that sells large quantities of wheat by her own grade specifications.

of this growing market because of her production resources.[1]

Some countries that at one time were self sufficient in wheat have become net importers. These countries include the Soviet Union and many Eastern European nations. As these countries try to improve the diet of their population they increasingly rely on imports for the grain used for human consumption and for the production of livestock. Also, some nations in Southeast Asia that have traditionally been rice consumers have been at least partly shifting to wheat as a major source of food.

The traditional customers for Canada's wheat have been the United Kingdom and countries in Western Europe as well as many Eastern European nations. Since the Second World War, countries in Western Europe and more lately, the European Economic Community (E.E.C) have pursued a goal of self sufficiency in the production of agricultural commodities. Through the use of protectionist agricultural legislation they no longer need to depend on imports to satisfy domestic needs.[2] In the last several years the E.E.C. has gone from the position of importer of Canadian wheat to one of competitor for export markets.[3] The U.S.S.R has also been a longtime customer for Canadian wheat. However, the size of Soviet imports are not stable or

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[1] see Appendix A Table 2.

[2] for instance, the Common Agricultural Policy (CAP) discriminates against imported foodstuffs through the use of a variable levy.

[3] In 1983,the EEC produced 59.2 million metric tonnes of wheat. In turn, it consumed only 49.6 million metric tonnes.

predictable as they traditionally vary with the size of the domestic crop and the current political and/or economic situation at the time. For example, in 1972-73 the U.S.S.R. imported 15 million metric tonnes of wheat and in 1974-75 only 2.9 million tonnes. As well, United States market share dropped from 48.4% of global exports in 1981-82 to 30% in 1985-86 and has only recently rebounded somewhat because of extraordinary marketing practises. Canadian and Argentine exports on the other hand increased during these two time periods. This can be explained in part by the U.S. grain embargo against the Soviet Union. It appears that although world wheat markets are expanding, these markets are increasingly subject to a variety of exogenous forces, making long range market projections subject to a high degree of variance.

The 1969 federal report on Agriculture (Federal Task Force on Agriculture *"Canadian Agriculture in the Seventies"*) commented that the Canadian Wheat Board had become an integral part of the Canadian grain economy.[1] The report went on to say that the Wheat Board is primarily a marketing agency and as such should not be expected to provide a solution to income problems confronting prairie farmers. It reaffirmed that the primary role of the Wheat Board is the sale of wheat and feed grains at the best possible prices.

---

[1] *Canadian Agriculture in the Seventies* Canada, Federal Task Force on Agriculture 1969 (P.80)

B. The Present Situation

The world wheat market at present is in a situation similar to that of the late nineteen sixties when the Task Force Report was commissioned. Agricultural markets are characterized by surpluses of many major export crops. Soviet grain purchases in the early nineteen seventies alleviated the problem of growing stocks then and prairie grain farmers enjoyed some profitable years. There is debate however, as to whether a similar recovery is likely today.

A sizeable American wheat residual has been overhanging international markets despite attempts to restrict production in the U.S.A. and the more recent aggressive export incentive programs.[1] Domestic support policy (ie. the loan rate for wheat in the U.S.A.) and the past strength of the U.S. dollar in the early 1980's was at least partially responsible for the accumulation of this reserve. Despite the Export Enhancement Program initiated under the 1985 U.S.A, Farm Bill, considerable surpluses still exist in the U.S.A.. There is some indication that stocks are beginning to decline but much will depend on the resolve of U.S. policymakers, the strength or weakness of the U.S. dollar, and the weather in the grain growing regions of the U.S.A.. Regardless of the future path of the dollar the effect of large residual wheat stocks is negative for cereal grain

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[1] The recent PIK or Payment in Kind program instituted by the American government was an example of an attempt to curtail production. It had only limited success. The more recent BICEP or Export Enhancement Program appears to be meeting with more success.

prices.

There is also evidence that the size of the wheat crop in some of the traditional wheat growing regions of the world has not fluctuated as much as in the past. Improved drought tolerance of new varieties and better resource management and farming techniques may have stabilized yields in many parts of the world. For example, recently there have been pockets of severe drought on the Canadian plains. However, yields have not declined as severely as they did in a similar situation during the nineteen thirties or for that matter, as severely as in 1961.[10]

Whether from genetic improvements or because of better cultural practices, the variability of the global wheat crop has decreased. From the data in Appendix A Table 3, one sees that the variability of yields in the last decade does not seem to be large despite periods of drought which occurred over much of the wheat growing area of Saskatchewan during this time period. At the Western Canadian level the variation is even less pronounced.

Another factor to consider regarding production stability is that earlier maturing varieties have enabled expansion of the boundaries of traditional wheat growing areas. Where once production risks were considered too high, the black soil zone of the prairie provinces now produces wheat on a wide scale. This has been accomplished because of the development of early maturing, disease resistant

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[10] Considered to be the driest year this century in many parts of North America.

varieties. In dry years when the traditional wheat growing areas experience reduced production, the black soil zone can and does produce high yields of quality wheat. Ironically, the likelihood that the problems facing producers caused by large wheat surpluses will be solved by a natural calamity, has been reduced by genetic engineering and improved cultural practises throughout much of the world.

C. Effects of Milling and Baking Technology

Historically, many importing countries have imported wheat that closely approximates the type of wheat grown domestically. This enables the local milling and baking industry to process the imported wheat with little or no technological changes. However, since the nineteen sixties, flour milling and baking technology has improved considerably. New methods for separating protein fractions have allowed millers to blend and substitute different qualities of wheat to obtain the desired end product. Therefore, countries that are faced with importation of wheat on a regular basis can be expected to replace aging milling and baking equipment with technologically up to date, more flexible machinery in order to take advantage of price differentials between types of wheat.

A major technological development that has had an impact on the structure of world wheat markets was the development of the Chorleywood Baking Process (CBP) in

England during the nineteen fifties and sixties. The CBP is a quick batch mix process which fits well into the routine of all but the smallest local bakeries. Its development has also contributed to the viability of the in-store systems in the more modern larger chain stores in industrialized nations. The significance of the CBP for world wheat trade is that the process made it possible for bakers to maintain the bread quality obtained with the larger scale continuous mix, bulk fermentation dough process while reducing the percentage of expensive wheats in the flour.[1] During the nineteen sixties, importation of Canadian wheat into the U.K. decreased markedly, whereas importation of medium-protein Australian wheat doubled. Earlier the use of English and French soft wheats in Britain was minimal. However as the U.K. became more fully integrated into the E.E.C. there was increasing pressure both within Britain as well as the rest of the Common Market to utilize soft wheats grown in the E.E.C.[2] The use of medium protein "filler" wheats such as Australian Standard Wheat diminished to the point where Australia no longer exports wheat to the EEC in significant amounts. British grists are now made almost exclusively using European wheats blended with only extremely small amounts of high quality Canadian and American wheats.

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[1] For a more complete explanation of the Chorleywood Breadmaking Process see "Breadmaking - The Modern Revolution" edited by A. Williams (The British Arkady Co.)

[2] The Common Agricultural Policy levy system sets prices for imported wheats at an artificial level making them unattractive to local millers.

Because it is less necessary to add large amounts of high quality wheat to the dough mix for traditional breads eaten in Britain, only a limited market for high quality wheat will continue to exist in the United Kingdom. In large part this is due to the high E.E.C. levies on imported wheat and so the reduction in hard wheat use may not be as widespread elsewhere where these new breadmaking technologies are adopted. However, this market may grow slowly, if at all, and the competition in this higher priced market will likely be keen. The milling industry is also making progress in the area of separating protein factions from lower quality wheats. Progress in this area may also serve to limit the amount of high quality wheats needed in the baking of quality breads.

Institutional Features

As new milling and baking technology spreads around the world, the need for high protein wheats in the dough mix for traditional breads will be reduced. As well, many regions prefer to consume wheat in other forms such as French breads, noodles, or steam breads. The overall effect is one of a shifting of demand to medium and lower quality wheats. If we look at Canada's shipments to industrialized countries in Appendix A, Table 4, we can get some idea of recent trends in traditional wheat markets. Canadian hard wheat exports to industrialized nations declined over the thirty year time period of the study, whereas shipments of hard

wheats to the middle-income developingcountries, the less-developed countries and the centrally-planned nations increased over the same time period. The implication is that industrialized nations such as Great Britain and the Western European nations have been able to reduce their dependency on hard wheats and incorporate usage of softer domestic wheats into the breadmaking process. As well, large increases in purchases of medium quality and soft wheats are noticeable in all but the industrialized group.

Much of the increase in exports of medium quality wheats has been from the U.S.A because of the large quantities of hard red winter wheat that is produced there. A proportion of this crop would fall into the medium quality category.[13] Canada has until recently had only the lower end of the hard red spring grades to offer to this market. Since medium quality wheats have significant yield advantages over the high quality wheats, it seems apparent that by discouraging the production of medium quality wheats the Canadian Grain Commission (the institution that controls the licensing and grading of western Canadian wheats) has lost market opportunities and restricted yield improvements that may have resulted in higher farm incomes in Western Canada.[14]

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[13] The Latin American market has largely been filled by American medium quality wheats

[14] It is generally accepted by plant breeders that a 1% decline in protein can result in an increase in yield of up to 10% (see Loyns, Carter, Kraut, Bushuk, Jeffrey and Ahmadi-Esfahai, *Constraints to Biotechnological Developments in Canadian Grains with Special Reference to Licensing of Varieties* 1984, p54.).

The Canadian Grain Commission (C.G.C.) has firmly held the view that the present strategy of almost exclusively encouraging the production of high protein wheats is the proper one. There is historical evidence that this may have been an appropriate strategy in the past. Differentiating a product on the basis of protein content seems to be a wise move when participating in a competitive marketplace. The concern is that the total market for high protein wheats is shrinking. Highprotein, hard red spring wheat has become a differentiated product with a specialized use. Its specific purpose in the milling and baking industry is as a mixer or enhancer of lower quality wheats. It appears that a major objective of the milling and baking industries is to decrease the amount of more expensive wheats used in the dough mix and still produce an acceptable product. This is likely to reduce the possibility of a long term increase in the per capita demand for high protein wheats because the protein content of bread is not a critical factor in the developed world. Therefore it makes economic sense for the baking industry to decrease the protein input, thereby decreasing input costs,as long as an acceptable product is produced.

Under some pressure from producers and other affected parties the Canadian Wheat Board [1] during the nineteen

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[1] The Canadian Wheat Board is the government agency which is responsible for marketing Canadian wheat, oats, and barley on the world market and maintaining a pooling system for prairie producers for those grains. The board is also responsible for regulating imports of wheat, oats and barley. The Canadian Grain Commission is the government

seventies, tested the higher yielding variety of wheat, Glenlea. Although a late maturing variety, it had high gluten strength and a higher protein level which made it desirable as a breadmaking wheat. It was also well accepted by prairie farmers because of its yield capabilities. The Canadian Utility or CU grade was created for this type of wheat. Market development for this type of wheat appeared to be given little priority (see Loyns et al 1984, p.45.) and as a result, large price discounts and low quota allocation characterized the market for Glenlea.

With the development, in 1974, of the 3M '' variety HY320, the Canadian Wheat Board was again under pressure to license and establish grades to acommodate medium quality wheats. The CWB contracted with prairie producers to grow HY320 to enable the board to test the marketability of such wheats. In 1985, HY320 was licensed and separate class and grades were established for wheats of this type. It remains to be seen whether this move is a change in policy direction by the board or whether it is an interim attempt to keep high quality hard red spring stocks from becoming contaminated by medium quality wheats.

One factor for consideration is that the advantages obtained from 3M type wheats are not significant enough in the traditional wheat growing areas to justify planting them

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'' (con:'d) agency responsible for administering the Canada Grain Act. Its two main activities are establishing and maintaining Canada's quality standards for grain and regulating the grain handling system.

3M designates wheats of medium protein content, medium gluten strength, and medium hardness

in place of hard red spring wheat (see Ulrich and Furtan, 1984). 3M wheats are well suited to the moister black soil zones of the prairies although some problems have been encountered with initial varieties because of length of maturation. Because these wheats are adapted to the moister areas of the prairies, Canada's supply of high protein, hard wheat would not likely be disrupted.

The recently established new grades for medium quality wheats should serve as a stimulus for the development of new varieties that are better adapted to the Canadian plains. These grades allow for departure from the criteria that new varieties must meet the "Marquis quality" requirement to qualify for licencing. The licensing and specification of grade standards for medium quality wheats may be regarded as a first step towards establishing long-term international markets for medium-quality Canadian wheats.

Licensing requirements as defined by the Canada Seeds Act provide guidelines for plant breeders when new varieties are being developed. Two guidelines in particular seem to be highly restrictive and illustrate the regulatory authority's preoccupation with quality and kernel characteristic. The first of these is that the variety being tested must be equal in quality to the varietal standard and the second is that the sample must be visually distinguishable from other varieties.

The varietal standard guideline has served to maintain the high quality reputation enjoyed by Canadian wheat, but

has also tended to inhibit development of varieties which might be superior in other respects, particularly with respect to yield. The second guideline, visual distinguishability, has also become a controversial requirement. Higher yielding varieties are not eligible for licensing under the present system unless they are equal in quality to Marquis. Since in most cases the increase in yield from higher yielding varieties could be obtained with little or no increase in input costs to the producer, the delay in developing and licensing 3M wheats appears to have resulted in poorer returns to the producer. This points out the need to develop a non-visual capability for varietal identification within the delivery system. Research to develop feasible tests for varietal distinguishability is proceeding. Their development should make that requirement obsolete for grading purposes.

It is essential to be able to quickly and accurately determine changes in the global market for wheat because of increasing competition within these markets. This study will concentrate on market structure and trends in the world markets for wheat over the last fifty years. Recognition of market trends and changes in the structure of demand are important in a country such as Canada for which export markets are so significant.'' Time-series data on wheat exports by major exporters will be analyzed to determine if the market mix of the various types of wheat has changed

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'' Canada relies on foreign markets to dispose of between 70 and 80 percent of her total yearly wheat production.

over time. Also, time series data on imports into major importing markets will be analyzed by source of import and by class where possible. This should further enable us to make some assumptions about market mix and trend within the global wheat market.

This study attempts to evaluate the performance of the five major wheat exporting entities, namely, Argentina, Australia, Canada, the E.E.C., and the United States in the global marketplace over a thirty year time span from 1955/56 to 1984/85. The particular subperiods defined for the analysis are 1955/56 to 1964/65 (Period 1), 1965/66 to 1974/75 (Period 2) and 1975/76 to 1984/85 (Period 3). The method used to analyse the data is the Constant Market Share (CMS) model. This model allows us to analyse export performance of the focus country by attributing change to four specific factors, namely: (1)the growth in world trade, (2)the commodity composition of the country's exports, (3)the market distribution of the focus country's exports and (4)a residual, termed the competitive effect, which represents the difference between a country's actual export performance and that which would have resulted had that country maintained a constant share in each market and commodity. From the results of this analysis it is hoped one can determine if the markets for the medium and lower quality wheats have been growing more rapidly than the markets for the hard wheats traditionally grown in Western Canada.

From this model we hope to be able to address the following: (a) What would the focus country's exports have been if they had expanded at the same rate as world trade? (b) What is the impact of the commodity composition of the focus country's exports on its export performance? (c) What is the impact of the growth in demand for the focus country's exports in the various importing regions? (d) A portion that remains is unexplained by the previous three factors and is attributed to changes in the focus country's competitiveness.

Chapter 2 will give a brief overview of some of the studies and types of models which have been applied in the past to global grain markets. This will lead into an explanation of the methodology of Constant Market Share analysis as it applies to world trade. Chapter 3 will then review some of the previous studies where Constant Market Share analysis and Shift - Share analysis, the name by which the approach is known in industrial location theory, have been used to measure growth. The sequential review of these studies should further enhance the reader's conception of CMS analysis as it is to be applied in this study.

Chapter 4 outlines the assumptions and results of the study. An analysis of the results for each of the focus countries (the country being analysed) will be given and details of the application will be discussed. In Chapter 5 there will be an attempt to draw conclusions from the results and discuss implications for the various focus

countries or entities. Suggestions for further study will also be discussed in Chapter 5.

II. RELATED LITERATURE AND THE BASIS OF THE CMS MODEL

There is little published information available on market prospects for various classes of wheat. This, in part, is due to the lack of available data and the difficulties involved in obtaining accurate data from importing countries.

Export statistics are not generally specific as to the particular grade or class of wheat exported to particular destinations, therefore in many instances assumptions are necessary as to grade of wheat exports depending on the exporting country. This is likely to make demand analysis for wheat of different classes or grades difficult and fraught with arbitrary assumptions.

A. A Brief Discussion of Studies Related to Analysis of Grain Market Shares.

One recent study of the economic evaluation of producing medium-quality wheat in Canada deals with the yield and revenue implications of producing the semi-dwarf wheat variety HY 320 as opposed to the traditional hard red spring wheats. This study was conducted at the University of Saskatchewan and led to the publication in 1984 of *An Economic Evaluation of Producing HY320 Wheat on the Prairies* by Alvin Ulrich and W. Hartley Furtan. The issue around which the paper revolves is whether the Canadian grading and licensing system has hindered maximization of producer's net

returns by adherence to policies which emphasize the development and production of high quality mixer type wheats which resulted in a delay in licensing HY 320, a higher-yielding medium protein wheat. The authors' main concern was the failure of the regulatory authority at that time to license the 3M variety HY320 even though preliminary test results indicated that it would on average yield 30% more than traditional hard spring wheat varieties. ''

The study used data for eleven crop years between 1972 and 1982. The prairie region was divided into crop districts and annual farmgate wheat sales were determined for these districts. Then calculations were made regarding overall yield increases, grades, and price levels that would have resulted had HY320 been grown in place of traditional wheats.

The results indicated that the black soil zone of the prairies was the area where the greatest advantage was obtainable by switching to HY320, especially in areas where grades for hard wheats are traditionally low.

The authors considered that conservative estimates were used regarding yield increases, price levels, and grades for the HY320 scenario (ie. switching all wheat acreage to the production of HY320). Their findings indicated that even under low price scenarios, HY320 increased returns to producers in the black soil zone. It is estimated that an additional 200 to 400 million dollars could have been added

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'' HY320 is now licensed and grades have been established to accomodate these types of wheat.

to farm income on the prairies, had producers grown HY320. This amount was comparable to the total net farm income for all farmers in Manitoba in 1982.

Estimating that HY 320 would be priced comparably to U.S. Hard Winter Ordinary (ie. above Canada Feed but below 3 CWRS) resulted in the economic incentive to grow HY320 being closely linked to the historic grading pattern for an area. Grading patterns for an area are associated with soil zones. The results of these price assumptions indicated that farmers in the brown soil zone crop districts (which have a history of higher grade patterns) would have less incentive to adopt the 3M varieties than those in the districts associated with the black and gray soil zones (those with lower grading patterns). However, Ulrich and Furtan's findings indicated that all crop districts would be better off growing HY320 exclusively if prices for this wheat were competitive with Australian Standard Wheat and with American medium quality wheat types.

The Saskatchewan study assumes that HY320 or other 3M type wheats grown in Canada would command a price similar to their major competitors, namely, Australian Standard Wheat and U.S. Hard Winter Ordinary #2. This assumption is predicated on the basis of increased marketings of 3M wheats being absorbed by the world markets without influencing price levels; that is, increased quantities of wheat in the marketing chain would not affect price levels. This may be somewhat naive depending on the characteristics of the

market into which this increased supply would enter. In other words, the question may be raised whether the market for medium-protein wheat is relatively slow growing with a relatively price inelastic demand or whether this market is an expanding one in which exporters face an elastic demand curve.

Carter, Loyns, and Ahmadi-Esfahani (1986) use a partial equilibrium model in order to estimate the economic welfare impact of changing the wheat regulatory system to allow higher-yielding varieties to compete with the traditional wheat types. Producers' gains from the adoption of the high yielding medium protein wheats were estimated to be relatively significant at between 5 and 17 percent of net farm income. The conclusions of the study were based on the assumption that Canada faces an elastic world demand function for the semi-dwarf wheat types. The study determined that elasticity of demand was a critical factor in determining welfare changes and as such accurate estimation is critical to this type of analysis.

More recently, Veeman (1987) estimated the marginal implicit values of major characteristics of wheat in the world marketplace for nine different wheats over two separate time periods, namely 1976-77 to 1979-89 and 1980-81 to 1983-84. Pooled time-series and cross sectional data for export wheat prices were used with other variables denoting protein content, color, country of origin, and time. Veeman's results indicated that a 1 per cent increase in

protein level was associated with a .32 per cent increase in price in the earlier period, and that in the later period, a 1 per cent increase in protein level was associated with a .47 per cent increase in price. The increase in the protein premium in the second period was attributed to global recession affecting lower-income countries, who traditionally use lower protein wheats to a greater degree than countries that import high protein wheats. The study concludes that total revenue from Canadian wheat exports could be considerably increased through development of higher yielding wheats adapted to the higher moisture regions of the prairies.

B. A Brief Overview of Models Analyzing Wheat Trade

One approach to measuring trade flows in the international market involves applying models to measure the elasticity of substitution of two goods. These types of models assume that price differences between regions are the major determinant of trade flows. They also treat a particular commodity as being homogeneous, which may be inappropriate when modeling international wheat trade. Importers are not indifferent to the source of imported wheat. Factors such as trade and institutional arrangements, political considerations and of course quality preferences influence trade flows among economic agents.

Capel and Rigaux (1974) analyzed export demand for Canadian wheat in 1974 using three different types of

models. A direct model, a substitution model, and a market share model were each used to estimate the price elasticity of demand by individual importers. These authors conclude that the substitution model did, in fact, give the most appropriate indications of price elasticities. However, the results are conditional because a model of this type makes the assumption that no cross-elasticities exist between an individual country's wheat and other commodities. The assumption is also made that income elasticities are the same for Canadian wheat as for other exporting nations' wheat.

The findings of their study were inconclusive in that the different models yielded widely varying estimates of price elasticity. However, large negative elasticity estimates predominated, indicating that there is likely a significant degree of responsiveness to price by importing nations. The magnitude of these price elasticities (greater than unity) suggests there is opportunity to realize greater gains through price reductions. Capel and Rigaux suggest that for these gains to be obtained, a multiple pricing system must be established. If such a system were not adopted by a marketing agent, gains realized through price reductions in appropriate markets would be largely offset by decreases in price in unresponsive markets. Their study concludes that the option of a multiple pricing system should be explored in Canada.

Elasticity of substitution models such as the one applied by Capel and Rigaux have been employed quite often to explain trade flows in international markets. As stated, an underlying assumption of these models is the homogeneity of the commodity being modeled, making price the major determinant of trade flows. This may have been more easily justified during the earlier part of this century when developed countries accounted for the major portion of wheat imports and the number of exporters was small. However, international wheat markets have changed radically in recent decades.

Developing nations, centrally planned economies and integrated market groups such as the European Economic Community have emerged as major influences on the traditional market structure. As a result, price differentials may have become only one determinant of trade flows. Export prices for wheat have tended to move together and it appears that short-term price increases have not influenced the market shares of individual exporters to a significant degree. This gives a further indication that quality preferences,'' trade patterns, and strategic factors must affect trade patterns.

Most countries use policy intervention in order to protect or insulate domestic agricultural sectors from world markets. Such policy interventions or variables can be said

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'' For example, 1CWRS wheat has become a differentiated product in the United Kingdom where its specific purpose is as an "enhancer" or mixer with poorer quality wheat.

to have a considerable impact on trade patterns. Earlier models such as the one developed by McCalla (1966) and some of the more recent ones such as the one provided by Alaouze, Watson, and Sturgess (1978) have not ignored government intervention. McCalla makes the case for a duopoly pricing model in which Canada is a price leader and the United States, through the use of an export subsidy, follows the Canadian price leader.

Alaouze, Watson, and Sturgess suggest that changes in the structure of the world wheat economy were such as to include Australia in the wheat exporting oligopoly. Again, the major underlying assumption in these models is that wheat is a homogeneous product. It is assumed, however, that elasticities of substitution between wheat from selling countries is sufficient that smaller exporters can erode the market share of the major exporters.

A possible problem with these approaches is that policy interventions are treated as exogenous influences and have not been subjected to econometric analysis. Studies by Zwart and Meilke (1979) and by Abbott (1979) have attempted to endogenize government policy. These are models of price intervention which show how common forms of discretionary intervention (for example, pricing policies, tariffs) at the domestic level can destabilize world prices. These and other studies of international agricultural policy impacts on trade indicate that most countries involved in the international wheat trade do have domestic policies that

influence world markets. Furthermore, such studies have provided evidence that changes in domestic pricing policy may be as effective as an international buffer stock policy would be in providing price stability.

Armington (1969) developed a model in which goods are differentiated by their country of origin. Elasticities of substitution are used to generate trade flows between all pairs of importing and exporting countries. Three basic assumptions are made in these models. First, the marginal rate of substitution between two kinds of wheat is independent of other consumer goods. Second, there is constant elasticity of substitution between any two types of wheat, and third, the elasticity of substitution between two kinds of wheat in a market is the same as the elasticity of substitution between any other combination of commodities in that market.

Grennes, Johnson and Thursby (1978) applied the Armington approach directly to agricultural commodities. They attempted to predict trade flows and carried out policy analysis with the model. Rather than estimating elasticities of substitution for each of the countries of origin they utilized existing elasticity estimates for several agricultural commodities for pairs of trading countries in all markets.

Another approach to analyzing a country's export growth is to apply constant market share analysis (CMS). The method was used in industrial location theory, where it is known as

shift-share analysis, as a means to measure locational shifts between regions for various industries. It has also been used in the study of export markets to assess whether export growth is attributable to a country's export structure or to its competitiveness. For example Rigaux (1971) used the technique to analyze market shares for Canadian wheat exports from 1963-64 to 1967-68. His analysis attributed export growth to two effects; namely, the "distribution" and "competitive" effects. Some limitations were evident from the analysis, mainly due to the randomness of the comparison periods and the short-run aspects of the of the study period.

C. Basis of the Constant Market Share Model

In its simplest form the CMS identity is:

$s = x/X = f(c/C)$, where:

s = the export share of the focus country,

x = exports of the focus country,

X = exports of the world,

c = competitiveness of the focus country,

C = competitiveness of the world. (see Leamer and Stern, 1970) [**]

Differentiating with respect to time gives:

$\dot{x} = s\dot{X} + X\dot{s}$ where a dotted variable denotes a time derivative of that variable. In this form, a country's export growth is explained by a global growth effect

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[**] Leamer, E. E. and R. M. Stern, *Quantitative International Economics*, Allyn and Bacon, Boston, Mass. 1970.

($s\dot{X}$), and a competitive effect ($\dot{X}s$). The global growth effect represents what a country's share would have been if it had maintained its share of exports while the residual, termed the competitive effect, is attributed to the country's relative competitiveness.

Recognizing that a country's export structure may be affected by specializing in low or high growth commodities or exports to low or high growth markets leads to a slightly more complex CMS model in which i, a particular commodity, and j, a particular market, are introduced. From the simple identity: $s_{ij} = \frac{x_{ij}}{X_{ij}} = f_{ij}\left(\frac{c_{ij}}{C_{ij}}\right)$, total export growth would be represented by: $\dot{x} = \sum_i \sum_j s_{ij}\dot{X}_{ij} + \sum_i \sum_j X_{ij}\dot{s}_{ij}$. By expanding the previous identity we acquire two additional terms with which can be measured the presence or absence of favorable commodity and market structures: $\dot{x} = s\dot{X} + \left(\sum_i s_i\dot{X}_i - s\dot{X}\right) + \left(\sum_i \sum_j s_{ij}\dot{X}_i\right) + \left(\sum_i \sum_j X_{ij}\dot{s}_{ij}\right)$

The first term on the right hand side of the expanded identity is viewed as the global growth effect and represents the country's growth in exports had it maintained its share of global growth. The second term is called the commodity effect or commodity composition effect and measures the degree to which a country's export structure was concentrated in high versus low growth commodities. The third term on the right side of the identity is termed the market effect. It attempted to measure the degree to which a country's export structure is concentrated in high as versus low growth markets. The fourth term was in effect a residual

term and represented that portion that is left over after the first three terms have been calculated. This residual is what is attributed to a country's success (or lack thereof) in terms of export structure, in other words, its competitiveness. In effect it is the difference between the focus country's actual market share and that predicted by the base period calculations.

This study uses CMS analysis to attempt to explain some of the trends and characteristics of trade flows in global wheat markets over the past thirty years. By ascribing favorable or unfavorable export growth to a country's export structure including market composition, commodity composition, and competitiveness, some inferences may be made about a nation's past approaches to production and marketing of wheat. Realistically, a comprehensive analysis of export growth should contain a variety of variables such as government policies, factor availability, technological infrastructure and demand characteristics. CMS analysis does not account for these variables and as such is used only as a vehicle to examine the past structure of a nation's export growth. Any inferences or assumptions made about future export growth are constrained by the scope of the analysis and its inherent limitations.

III. THE DEVELOPMENT OF SHIFT-SHARE OR CONSTANT MARKET SHARE ANALYSIS

The methodology involved in CMS analysis was originally applied to analyzing problems involved with industrial location and regional shifts of manufacturing industries and in this context is known as Shift-Share analysis. Factors which determine the location of specific manufacturing industries are numerous and complex, and rapid changes in locational patterns occur in many industries in a relatively short period of time. Creamer (1942) was the first to formally apply this methodology to an economic problem and his analysis provides the basis for all the more recent studies using the Shift-Share or the Constant Market Share technique. He attempted to measure and explain geographic changes that had occurred in American manufacturing based on shifts or redistributions in employment within the manufacturing sector between 1929 and 1937. The conclusions drawn from the comparison of these two time periods were restricted by the inherent problems or limitations involved in comparing two discrete periods.

The analysis was limited to 141 U.S. industries which reported more than 10,000 wage earners in either 1929 or 1937. The percentage change between the two time periods was calculated for each of the 141 industries and then grouped according to the following:

Group 1: Increases of 24 per cent or greater

Group 2: Increases of 6 to 24 per cent

Group 3: Increases of 1 to 6 per cent

Group 4: Increases or decreases of less than 1 per cent

Group 5: Decreases from 1 to 11 per cent

Group 6: Decreases from 11 to 21 per cent

Group 7: Decreases of 21 per cent or greater

Creamer described the types of locational shifts either into or away from an area, in this case, a U.S. state. "Absolute shifts" were described as occurring in one of two ways. Firstly, an "absolute shift" occurs if employment shifts into a state at a greater rate than into the whole nation or from employment increasing in a state while it declined nationally. In the first instance, the shift was measured by calculating the state's actual growth and its proportional share of the U.S. increase. In the second case the computation is performed by summing the state's actual increase and its proportional share of the national decline.

Similarily, shifts away from a region or state are classified as either "absolute" or "relative" shifts. "Absolute shifts" occur when an industry that has expanded employment nationally contracts in the state or focus region. This shift is measured by summing the decline with the gain that the state or focus region would have attained if it had received a proportional share of national expansion. The second type of absolute shift occurs when employment in an industry that has been declining nationally

falls at a greater rate in the focus region. This is measured by calculating the difference in the rate of actual decline between the focus region and what would have been achieved had it attained its proportional share of decline. A "relative shift" occurs when the industry that has expanded employment at the national level expands in the focus region but at a lesser rate than at the national level. This is measured by taking the difference between the actual gain and that which would have been attained had the focus region had its proportional share of the national increase.

In a given industry, shifts into will equal shifts away from, or all wage (non management) jobs will equal all shifts, either into or away from an industry divided by two.

Creamer measured the amount of change in an industry by using the available data to total all shifts in the focus state, dividing by two, and expressing the result as a ratio of wage jobs in the whole industry in the second time period (ie. 1937). Shift ratios were calculated for 139 industries and presented in a format of seven groupings. Creamer noted that the median shift ratio for the entire group was only 8.6 percent and that two-thirds of the group had a shift ratio of less than 11 percent. More interestingly, but perhaps not unexpected, was that the median ratio for groups 1, 2, and 3 was 10.5 percent while the median ratio for contracting industries was 7.8 percent. The hypothesis behind this difference is that expanding industries

acquiring new capacity can shift more easily than contracting industries dealing with unused capacity. Indeed, the study noted a direct correlation between the size of the median shift ratio and the degree of expansion in groups 1, 2, and 3. The declining industries showed no such relationship between pecentage decline and median shift ratio.

Creamer went on to classify the 139 industries as either "shifting" or "non-shifting" based on the median number of wage jobs involved in shifts for the 139 industries. He somewhat arbitrarily labels industries with wage job shifts greater than the median as "shifting", unless they fell into the bottom quartile with regard to shift ratios. The others were labelled "non-shifting". Of the 139 industries in the study, 72 were labelled as "shifting" industries. Because the shifting industries were by definition those in which wage job shifts exceeded 2516 (the median number of wage job shifts for the 139 industries) it was natural that the industries showing the greatest number of shifts were the larger ones and also tended to expand at a higher rate than the entire group.

Creamer used the ratio of wages to value-added to ascertain whether there was a noticeable difference between the "shifting" and "non-shifting" industries. His findings indicated that this ratio tended to be greater for shifting industries, suggesting that labor cost differentials were likely a contributing factor in many of the shifts.

Tyszynski (1951) used Creamer's analysis as a model and adapted differential analysis or "Shift-Share analysis" to world trade. His study was an attempt to measure the significant changes in global demand structure for exports of manufactured commodities. He pointed out improvements in industrial equipment and transportation over the period under study had clearly disadvantaged some types of industries and in turn some countries. The older industrialized nations had adapted in varying degrees to change. The aim of the study was to present a clearer picture of the changes in the competitive positions of the world's leading manufacturers and to identify changes in world demand for exports.

The study identified five years over which to perform a comparative analysis. Four of these (1899, 1913, 1929 and 1937) were chosen because they were years of peak economic performance. A further year, 1950, was included because it was the year for which the most recent data were available and since it was also a year in which global recovery from World War II was well under way.

Manufactured commodities were categorized into sixteen groups and changes in the percentage share of the individual groups were measured for 11 countries [21] which in total accounted for 80 to 85 percent of the total world trade in these commodities from 1901 to 1938.

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[21] U.K., U.S.A., France, Germany, Belgium, Italy, Sweden, Switzerland, Canada, India, Japan

The study identified three criteria upon which manufactured goods were classified: the nature of the material; the stage of production; and the final use. Since the primary concern of the analysis was to study international location of industry, grouping articles having fundamentally different production processes, labor requirements, or capital needs was considered to be inappropriate. Tyszynski also did not attempt to differentiate between consumer goods and capital goods in his categorization of industries. More useful information may have resulted had he attempted to do this.

Another problem identified in the study was that of harmonizing the different classification systems of the various countries. To do this, the items under each national classification system were disaggregated and regrouped under the 17 classifications adopted by the study.[22] In general, goods for re-export were excluded except in cases where further processing or manufacturing added substantially to the value of the good. Tyszynski also used reported annual average rates of exchange to adjust values to pounds sterling.

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[22] The Belgium Tariff Negotiations or BTN, a group of mainly industrialized nations, is presently attempting to get the majority of nations in the World to adopt a system of reporting trade statistics in a standardized format known as The Harmonized System. This system would combine both the tariff and the statistical reporting classifications into one system and would be standardized for all countries adopting the system. The United Nations is supporting the move to the Harmonized system and as of 1988, the St[illegible]rd International Trade Classification will be dropped [illegible] the H.S. system adopted.

The first analytical step of the study involved the re-classification for the five separate years under study. Next, the percentage share of each of the sixteen groups of manufactured product exports from the eleven countries was calculated for the five chosen years and listed in order of the largest average annual increase for their share of world trade. Tyszynski fitted a regression line across the five period (year) groupings and measured the slope in order to determine the average annual growth rate in manufactured products. Based on this growth rate five industry groups were classified as expanding, five as stable and six as declining. These trends tended to be steady.

The author then identifies "absolute" and "relative" increases and attempts to explain some of the expected and unexpected results for the various groups. Next, he calculates the percentage share of total world trade (i.e. the manufacturing exports of the eleven nations) for each country. Because nine of the nations in the study experienced a significant increase in trade between 1937 and 1950,(largely at the expense of Japan and Germany, due to World War II), the analysis was performed over the period from 1899 to 1937.

Recalculations were done to determine the percentage shares between 1937 and 1950 excluding Japan and Germany, in order to establish how the nine nations compared. This indicated that exports from all the countries, except Belgium, increased in absolute terms between 1937 and 1950

at the expense of Japan and Germany, and that the largest increase was from the U.S.A. and France. The U.K. on the other hand, suffered the largest relative decrease in relation to the others.

Tyszynski noted that a nations share of global trade may change due to one or both of the following: 1) its share of trade in each commodity or category may remain the same while the relative importance of the categories change; or 2) its share of individual groups may decline. Tyszynski labels these as a change in the structure of world trade; and, a change in a country's competitiveness. To measure these two causes, it was assumed that countries continue to maintain their initial share of the market (their competitive position in year one) in the final year of the period under study. The difference between the hypothetical share in the final year (computed from the base year share) and the actual share in the base year was attributed to the change in structure of world trade. The difference between the hypothetical share for the end year and the actual or observed share for the end year was attributed to the country's competitiveness. This comparison was done for the eleven nations for the two time periods of 1899 and 1937 and subsequently for four nations for the two time periods 1937 and 1950. Interestingly, the changing structure of world trade had significantly less impact on the results than did the change in competitiveness for all nations.

Tyszynski concluded that there did not seem to be a positive correlation between improved competiveness and a nation's degree of concentration in export commodities which are expanding world trade. France, for example, showed a shift in structure towards the expanding groups of commodities but apparently suffered a decline in competitive position in world markets during the period of the study.

Tyszynski concludes that changes in the patterns of world trade in the fifty years under study were fundamental structural changes. The three countries which gained most in export markets, namely, the U.S.A., Japan and Canada, did so by improving their competitive positions in different groups of commodities. It was concluded that comparative advantage in production from different endowments enjoyed by each nation underlaid the observed changes.

The study also concludes that changes in relative position among the eleven countries were due to a country's ability to compete in markets for various individual commodity groups rather than structural shifts in world demand for exports. As well, there was no clear correlation between changes in the structure of trade (expanding, stable or declining) and the individual country's percentage share of world trade.

For the period between 1937 and 1950, eight of the nine major exporters (Belgium excluded) benefitted from the post-war decline in both Japan's and Germany's competitiveness. Of the eight countries, it was apparent

that the U.S.A., France and Canada had marked improvement in their comparative position while the U.K. had a substantial relative decline.

Spiegelglas (1959) conducted a study to determine whether patterns of world exports of manufactured commodities had altered between 1937 and 1956 (a relatively normal pre-World War II year and a post-recovery year respectively). A second purpose of the paper was to update the findings of Tyszynski's study.

Spiegelglas adopted Tyszynski's classification of commodity groupings in order to facilitate a meaningful comparison. Two countries (Switzerland and India) were omitted and Tyszynski's results were adjusted to facilitate the nine country format. The nine countries, namely the United States, Canada, Japan, Italy, Sweden, United Kingdom, Germany, France and Belgium accounted for over 85% of the value of the exports of manufactured goods for all countries in 1956.

Calculations showing the percentage share of world exports of manufactures of the nine countries for 1937, 1950 and 1956 revealed that the U.S.A. had attained the dominant position in world export of manufactured goods by 1956.

The study determined the competitive positions of the various countries within the commodity categories for the years 1937, 1950 and 1956 and calculated each country's share for each of the seventeen commodity groups in each of the three years. From this the author was able to determine

the number of categories in which a country's share improved or worsened. The procedure used by Tyszynski was adopted. Thus, hypothetical total export figures and subsequently shares are computed for each country for the year 1956, based on the assumption that each country maintained its base-year share in the final period of the study. The difference between these hypothetical shares and the actual share in 1956 was defined as the competitive effect. On this basis, it was concluded that the United States, France, Canada, Italy and Belgium improved their competitive position at the expense of the United Kingdom and Germany.

Next, the study determined the changes in relative importance of the individual commodity groups. Spiegelglas uses the same approach as Tyszynski in that he divided the commodities into groups that were expanding, stable, or declining.

Spiegelglas concluded that the analysis indicates that almost without exception, the world export shares of the countries after 1950 tended to revert back to their 1937 position. That is, six countries (Belgium excepted) moved downwards while Germany and Japan tended to move upwards. He further concluded that 1956 more closely resembled 1937 than did 1950. Comparing the trends, 1899 to 1937 and 1937 to 1956, shows that nine of 16 commodity groups maintained their long term trends and more important, a further four groups reverted back to their pre-war position following World War II.

Spiegelglas devised a test to measure stability between the two time periods, which he calls a "coefficient of stability" or "S" measurement. The procedure involved converting all numbers into rankings for each matrix. Another matrix was then generated which provides the differences between the corresponding ranks for the countries involved. The sum of the positive or negative differences was then calculated and used as the numerator in the following formula:

$$S = 1 - \frac{\frac{\sum |u_i - u_{i-1}|}{2}}{\frac{N^3}{4}} \qquad \text{(Fig. 3.1)}$$

where: u is the rank of each entry in year i: and
N is the total number of observations.

Spiegelglas' use of rankings to determine stability ignores the magnitude of differences involved in the rankings and as such may be somewhat simplistic. Differences in the magnitude of change within a non-changing ranking may be equally as important as the ranking itself. His results indicated that the time period 1950 to 1956 appeared to be the most stable.

The study concludes that changes in both "competition" and "structure" were influential in changing the distribution of world exports over the 1937-1956 period with the competitive effect being the stronger of the two. Also, pre-World War 2 patterns tended to be restored in the 1950

to 1956 period.

Subsequent to the earlier CMS studies conducted by Tyszynski, Baldwin (1958), and Spiegelglas, many analyses have been conducted using this technique and there has been much discussion as to the appropriateness of this type of analysis for measuring export growth.

Stern (1967) used CMS analysis to measure the changes in Italy's exports using data for the years 1955, 1959, 1962, and 1963. The calculations were based on seven commodity groups defined under the Standard Industrial Trade Classifications (SITC) and applied to ten importing regions. Stern noted that to have a more rigorous analysis would require that the goods be grouped into more homogeneous categories, but because of data constraints, the study was forced to use SITC classifications.

The study adopted the standard CMS format:

$$X' - X = \left(\sum_{i=1}^{7} r X_i - \sum X_i\right) + \left(\sum_{i=1}^{7} r_i X_i - \sum r X_i\right) + \left(\sum_{i=1}^{7}\sum_{j=1}^{10} r_{ij} X_{ij} - \sum_{i=1}^{7} r_i X_i\right) + \left(\sum_{i=1}^{7}\sum_{j=1}^{10} X'_{ij} - \sum_{i=1}^{7}\sum_{j=1}^{10} r_{ij} X_{ij}\right) \qquad \text{(Equation 3.2)}$$

where:

X=Italian exports in period 1;

X'=Italian exports in period 2;

r=increase in world exports to all importing areas (except Italy) between adjacent time periods;

i=denotes the commodity groups; and

j-denotes the importing regions.

In applying the model, first the amount by which Italy's exports would have increased over the base year if they had grown at the same rate as world demand, was calculated. In notational terms this is, $\sum_{i=1}^{7} r X_i - \sum X_i$.

Secondly, an estimate of the increases which Italy would have realized in each commodity group, had they risen at the world rate for each group, was calculated. This amount was then subtracted from the amount for each group had they risen at the same rate as total world exports. Thus, notationally: $\sum_{i=1}^{7} r_i X_i - \sum r X_i$.

The third step was to estimate Italy's increases in exports for each commodity group had it maintained its share in each major market for that particular category. From this is subtracted the amount by which each commodity group would have increased had it risen at the same rate as world exports of that particular commodity. In notational terms this is $\sum_{i=1}^{7} \sum_{j=1}^{10} r_{ij} X_{ij} - \sum_{i=1}^{7} r_i X_i$.

The sum of these three terms was then deducted from the total increase in Italian exports. The remaining portion was then attributed to Italy's competitiveness or lack of it over the period of time under study.

In summarizing this section of his analysis, Stern touched on some of the limitations inherent in the method of calculation, especially as it pertains to his data. The analysis assumes that the various factors specified in the study are independent and additive. It is assumed that each

component can be isolated without ambiguity. Stern notes that the levels of data aggregation may also be a shortcoming in CMS studies. Changes that may occur for a particular commodity within the commodity grouping or for a country within the regional groupings cannot be analyzed even if they are responsible for shifts in export shares for the group.

Richardson (1971) identified and summarized some further problems which arise in the application of Constant Market Share analysis to export growth. He pointed out that the basic identity of the approach is: $s = q/Q = f(c/C)$, where:

s=focus country's export share

q=total exports of the focus country

Q-total world exports

c=competitiveness of the focus country

C=world competitiveness.

Richardson noted the problem of choosing an appropriate measure to determine relative competitiveness. He noted that most studies use relative prices but that price alone as a measure omits influences from such variables as improvements or declines in quality, servicing and trade arrangements. Another underlying problem in CMS analysis is deciding what is the appropriate measure of export shares. Some CMS analyses have used export value shares because reliable volume or quantity data are not available in many cases. The

problem with using value shares is that shares will not only vary with relative competitiveness but also with changes in relative price. In other words, an increase in relative competitiveness which is consistent with a fall in relative prices could lead to a fall in export value share if the elasticity of substitution was less than one. Even if the changes in quantity and value shares are in the same direction, a bias is introduced because rarely if ever will the magnitude of the change be the same. The competitive effect, which depends directly on changes in export share, could be either positive or negative and still be consistent with falling relative prices. Richardson notes that conceivably, CMS analysis could be performed using both values and quantities with totally contrasting results regarding the signs of the commodity, market and competitive effects.

Richardson also points out that the elasticity of substitution relationship implied by the simple share function equation $s = q/Q = f(c/C)$ has some limitations with regard to commodity homogeneity. Generally if goods are homogeneous, or relatively so, prices vary over a small range. In reality, regional market shares for items may be quite sensitive to other factors which can shift demand. Supply factors such as strikes or weather, can affect market shares and not be reflected in prices. As well, if commodities are not highly homogeneous or can be differentiated by source, then prices will not be the only

variable influencing export shares. Income and availability may be equally as important.

Richardson also refers to the problem of defining an appropriate standard area. What is the "proper" world for a particular nation's exports? For example, it could be inappropriate to use a particular region as the appropriate standard area when attempting to measure the competitiveness of a country which trades mainly within other specific geographic regions or within a particular economic union. Depending on the countries and commodities being analyzed it may be more appropriate to specify a different "world" for each focus country in the analysis.

The study also identifies two problems involved with the actual application of CMS analysis. There is potentially wide variability in results due to differences in commodity aggregation and/or market groupings. The problem of heterogeneity of goods is one that Stern (1967) also discussed. For example, classifications containing variations in type of commodities (i.e. new improved lines of goods vs. obsolete goods) can distort the analysis because one country may have a greater number of new improved goods in a particular category whereas another may possibly have very few. Variations within market groupings can also distort results.

Richardson also points out that the basic CMS identity can be applied to calculate the "market effect" before the "commodity effect" with equal correctness. That is,

$\sum_j s_j \dot{Q}_j - s\dot{Q}$ where j stands for the market total for all commodities, becomes the market effect and

$\sum_i \sum_j s_{ij} \dot{Q}_{ij} - \sum_j s_j \dot{Q}_j$ becomes the commodity effect.

A second major problem described in the Richardson study is that of the time periods used as base periods in the analysis. In reality CMS analysis is performed over a discrete period of time. The CMS identity, however, refers to a distinct point in time. The simple CMS identity could be written in several ways. Firstly, $\Delta q = s^0 \Delta Q + Q^1 \Delta s$ could be a standard way of performing the analysis, where the superscript 0 indicates the first point in time and 1 indicates the second point in time under study and where q is the quantity exported by the focus country, s is the expected share for the focus country and Q is the total exports for all countries. Equally as proper, Richardson points out that the identity could be rewritten as:

$\Delta q = s^1 \Delta Q + Q^0 \Delta s$, or as: $\Delta q = s^0 \Delta Q + Q^0 \Delta s + \Delta s \Delta Q$

where $\Delta s \Delta Q$ is an interaction term. In effect, the difference between the first and second identity is the base period weighting. The third identity uses the beginning of the period under study as the base and accounts for the change over time with the interaction term $\Delta s \Delta Q$. None of the three identities has any particular superiority over the other; however, Richardson suggests that it might be useful to derive information from the data set using the three methods as more comprehensive conclusions may be drawn without having to further

manipulate or enhance the data set.

Richardson considers that an equally important criterion for measuring competitiveness would be whether a country is able to dominate not only in the commodity group that represent a high proportion of global trade, but also whether a country has increased export shares in the rapidly growing categories. Therefore, the interaction term, $\Delta s \Delta Q$, could be useful for deriving more information from the data, although it is no more than the difference between the two competitive effects $\sum\sum Q^1 \Delta s$ and $\sum\sum Q^0 \Delta s$ where again, 0 and 1 refer to the beginning and the end of the period under study.

Richardson concludes by suggesting three methods of improvement in the implementation of the CMS technique. They are:

1. the calculation of several sets of CMS effects through the use of different base weights or starting points within the same set of data.

2. the selection of the "appropriate" world for each competitor and, ideally, for each commodity.

3. the use of quantity data rather than values.

A more recent example of Constant Market Share analysis is a study conducted by Bowen and Pelzman (1981) for the U.S. Department of Labor. The study analyzed U.S. export growth for the period 1962 to 1977 using three particular subperiods (1962 to 1969, 1970 to 1973 and 1974 to 1977).

The results suggest that over the period of the study the major factor contributing to increased U.S. exports was the increase in global trade. Conversely, the major factor inhibiting U.S. export growth was the competitiveness effect. The author explains that, as noted by Richardson, a country's decline in competitiveness may largely be a reflection of decreases in relative prices which normally accompany an expansion in exports. This suggests that countries experiencing faster growth rates should gain increased share in world trade. If this is so, there should be a correlation between a nation's gross domestic product (GDP) and export unit values. Bowen and Pelzman compare growth rates of export unit values for the three time periods for several selected industrialized countries. The results indicate that in the second two of the three time periods, U.S. export unit values were considerably smaller than for major competitors.

The author hypothesizes that because U.S. GDP was lower than for its major competitors in all three subperiods, the measured loss in competitiveness could be due to the growth in GDP among major trading partners. They suggest that it is not surprising that economic growth would be tied to export performance, but, what may be questionable is the attempt to isolate this factor from a country's measured competitiveness. Bowen and Pelzman present a comparison of the growth rates in export unit values for selected industrial countries for the three time periods. The authors

concluded that the results tended to verify the suspicion that a decline in the competitiveness component may be associated with a decline in relative prices and not necessarily only a decline in "competitiveness".

Bowen and Pelzman conclude that over the entire 1962-77 period the U.S. experienced a decline in competitiveness which showed up in the residual or competitiveness component of the CMS equation. In some instances the market distribution and commodity effects enhanced the U.S. position, but the overriding impact was the residual effect.

Overall, the major conclusion emerging from the study was that the decline in U.S. export shares in the 1960's and early 1970's was due to competitiveness factors plus slower growth in key export markets, expecially in the early 1970's.

IV. CMS ANALYSIS OF GLOBAL WHEAT MARKETS

The last thirty years have seen considerable increases in global wheat trade as well as some change of players in the market place. Canada, the U.S.A., Australia, Argentina and more recently, the European Economic Community (EEC) have emerged as the major exporters of wheat. Conversely, countries such as the Soviet Union have changed from being net exporters of wheat to large net importers of many cereal grains.

This study attempts to measure the relative competitiveness of the five major wheat exporting countries or regions. These are the U.S.A., Canada, Australia, Argentina and the E.E.C.. Table 1 of Appendix A provides data showing wheat exports for each of these major exporters (along with the total global trade in wheat) for the years 1961 to 1985.

From this data one can ascertain that the five major exporters consistently account for over 80% of world wheat trade and in recent years this figure has risen to over 90%.

A. The Model

A number of factors affect a country's relative competitiveness in a given world market. Factors such as price and a variety of non-price influences such as product quality and infrastructural services, play a role in determining a country's competitiveness. Although influences such as domestic shortages or changing demand conditions are

factors which may affect a country's "competitiveness", historic analysis of market shares can provide some basis from which to assess competitiveness.

This study attempts to evaluate the performance of the major exporters, for three wheat types: hard wheats, medium wheats and soft wheats over four different importing regions (industrialized countries, middle income developing countries, less developed countries and countries with centrally planned economies).

The method used to analyze export performance for the various countries and types of wheat is the CMS model. This model attributes or divides the growth of a country's gross exports [33] into four separate effects. These are termed the world trade effect, the commodity composition effect, the market distribution effect and the competitiveness effect.

The approach attempts to measure the extent to which a country has maintained its export growth rate or has deviated from a "constant share norm". The market distribution effects or the commodity composition effects may explain differences in exports over time for a particular country. Deviations from the norm could also be explained in part by the focus country's increased or decreased concentration in growing or declining markets, or by that country's concentration in commodities for which demand is growing or declining more rapidly than the global

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[33] Gross exports data were obtained from the Australian Wheat Board, the Canadian Wheat Board, the United States Department of Agriculture and the International Wheat Council.

norm. The fourth component of the identity represents the difference between a country's actual increase in exports and that which would have been attained had the country maintained its "constant share" for each commodity in each market; it is sometimes calculated as a residual.

The CMS identity in this study can be written as:

$$X' - X = \left(\sum_i r X_i - \sum_i X_i\right) + \left(\sum_i r_i X_i - \sum r X_i\right) + \left(\sum_i \sum_j r_{ij} X_{ij} - \sum_i r_i X_i\right) + \left(\sum_i \sum_j X'_{ij} - \sum_i \sum_j r_{ij} X_{ij}\right) \quad \text{(Equation 4.1)}$$

where:

r =growth rate of total world trade in wheat.

r_i =growth rate of global wheat trade in wheat type i.

r_{ij} =growth rate of wheat imports of wheat type i by region j.

X =total wheat exports of the focus country in the base period.

X' =total wheat exports of the focus country in period two.

i =type of wheat (i.e. hard, medium, soft).

j =importing region.

The first term on the right hand side of the identity is the world trade effect. This indicates what the focus country's wheat exports would have been if they had expanded at the same rate as the global trade in wheat. The second term or commodity effect indicates the influence of the change in the composition of the focus country's wheat

exports on growth. For example, if a country specializes in medium protein wheat and global trade in this type of wheat is growing rapidly, we would expect to see that country's wheat exports also growing rapidly. The third term, the market distribution effect, measures whether the focus country's exports are being directed towards a growing or declining sub-market and whether or not the country's exports are growing or declining proportionately. The last term, the residual, is termed the competitiveness effect and indicates the extent to which the focus country's wheat exports were above or below the "constant share" norm or that portion explained by the first three terms.

As previously explained, the CMS procedure has conceptual and empirical limitations. Conceptually, the CMS equation is an identity and although it can have a causal interpretation it is not clear that the CMS identity does have such a relationship to a country's export performance. A more comprehensive analysis of export growth could examine a wide variety of factors such as market structure, demand patterns, factor availability, and government policy. This study uses CMS analysis as a basis for some interpretation of world wheat markets with the realization that a more comprehensive analysis may be warranted upon examination of the results.

Because the analysis uses quantity shares rather than value shares, it avoids the pitfall present in CMS studies that use value shares as a proxy for analyzing export

growth. As pointed out by Richardson (1971, p. 231) a positive commodity effect, which would normally be attributed to a focus country's exports being skewed toward commodities experiencing rapid growth, can also be partially explained by commodities whose relative prices are rising rapidly. World wheat market studies based on quantity shares will be unhampered by this distortion of the commodity effect. Another qualifier with this type of analysis is that the CMS procedure provides an evaluation of past shifts in a country's exports and as such does not provide an indication of a country's future performance, other than that which can be obtained from projecting future export trends from past information. Identifying future trends in global wheat trade cannot be solely based on past shifts but must be qualified by knowledge of the likelihood of changes in both demand and supply factors. Besides the conceptual problems identified here, CMS analysis also suffers from problems of applications which have been identified previously. The major issues and problems are outlined below and an explanation of how each of these are applied in this study is given.

Level of Commodity Aggregation

The first problem arises from the fact that the components of the basic identity will vary with the level of aggregation of the commodity classes. It is desirable to have the commodity classifications as homogeneous as

possible but in many instances lack of disaggregated data or the cost of collecting and processing such data may lead to the use of broader commodity groupings.

This analysis categorizes all wheats traded globally into three groups, namely, hard, medium and soft. These categories rather than referring only to the actual physical hardness of the wheat are more closely linked to protein content and as such may be more appropriately labelled as such. Nonetheless, for this study we have assumed that protein content is generally linked to physical hardness and have named the categories accordingly. In a sense this categorization seems quite simple, especially since purchasing nations may often substitute wheats from one class in favor of another. However, in the last decade there appears to be growing evidence that high quality hard wheats are becoming more differentiated and that they are being used more often as "mixer" wheats [14] . For example, the European Economic Community which is a net exporter of wheat still imports sizeable quantities of high protein wheats from Canada to enhance the quality of the dough mix with which they produce a more acceptable quality of bread. Similarly, Japan uses a proportion of high protein hard wheats in many baking applications.

Medium protein wheats are used as "filler" wheats [15]

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[14] "mixer" is a term used to refer to high protein wheats which are used to increase the leavening qualities of the dough mix for certain baking applications.

[15] "filler" is a term used to refer to a broad category of wheats that are used to form the bulk of the dough mix in applications that do not require high rising capabilities.

and generally have broader uses than do the hard wheats. They are used in the dough mixes for the production of both leavened and unleavened breads and other baking applications suited to the lower protein content of these wheats. Australian Standard White (ASW) and U.S. Hard Winter Ordinary (USHWO) are the two main types traded internationally that fall within this class. They have a wide variety of applications for human consumption as well as being used for feed, especially in times of global surplus.

The soft wheats also have various applications depending on where they are used but in most parts of the world they are considered a pastry wheat and as such are used in cakes, cookies, biscuits and many unleavened products.

This study analyzes the market growth for three categories of wheat, thus some arbitrary decisions were made as to into which category different types or grades of wheat would be placed. Table 4.1 gives the categories of classes of wheat used in this study.

Wheats from Argentina are placed in the hard or high protein category because they are of the hard red spring bread-making type. Argentine wheat generally trades at a discount to other exporting nation's hard spring types in part because of quality variations from region to region and

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[18] (cont'd) These wheats have a much more diverse usage than do the hard wheats in that they are used in many parts of the world in noodles and steamed breads as well as a variety of othe unleavened applications.

Table 4.1 COMMODITY CATEGORIES USED IN THIS STUDY.

HARD	MEDIUM	SOFT
Argentine wheat	Australian wheat (chiefly ASW)	E.E.C. wheats
Canadian wheat	U.S.A. (HRW grades)	U.S.A. (SRW)
U.S.A. (DNS grades)		U.S.A. (SWW)
		U.S.A. (other)
		Other nations' wheats

CW - Canadian Western
HRW - Hard Red Winter
DNS - Dark Northern Spring
SRW - Soft Red Winter
SWW - Soft White Wheat
ASW - Australian Standard Wheat
other - mainly admixtures

year to year, and a grading system which is less exacting than, for instance, Canada's system. Argentina also pursues an aggressive pricing policy because exports of agricultural goods are a major source of foreign exchange which Argentina is chronically short of.

Most wheat from Canada is placed in the hard category. 1 CWRS [1] is generally acknowledged to be the most uniform, highest quality bread-making wheat in the world. The majority of Canadian wheat exported to other nations is of the hard red spring variety and is traditionally used as a breadmaking wheat. However, recently large amounts of Canada 3CW wheat has been traded for use as a "filler" wheat for bread-making. Also, in recent years, significant amounts of 3CW and Canada Feed grades of wheat have been exported to world markets, especially to the People's Republic of China. While these may be intended for use as animal feed, much of this wheat is also used for food. In times of global grain surpluses one might speculate that Canadian wheat would be more apt to enter into feed market channels than in years of shortage. However, even in the last five years it is apparent that the shipments of Canada's top quality hard red spring types, even in the face of unprecedented surpluses, are relatively high. Because of its reputation, the historic usage pattern and the relatively consistent and high protein level, Canadian wheat exports in total have been regarded as "hard" for this analysis.

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[1] #1 Canada Western Red Spring Wheat

U.S. Dark Northern Spring wheats are hard red spring types but have historically been discounted slightly from Canadian Western Red Spring largely because of a less exacting grading system. This class has also been categorized as "hard" for this analysis.

Exports from Australia have been placed in the "medium" category because the large majority of Australian wheat exports consist of Australian Standard Wheat (ASW).[17] ASW can be viewed as a "filler" type wheat in terms of baking traditional British and North American breads, and is used by countries that either mix in small amounts of higher quality wheats or in uses where the leavening quality of the dough mix is not a prime concern.

U.S. hard red winter wheat (USHRW) has also been placed in the "medium" category though there is likely some overlap with the "hard" category because of the higher quality of the upper end of the grades for this type. Again, because the majority of the wheat in this class is traded as Hard Red Winter Ordinary, which more closely competes with medium quality filler wheats, it was decided to place this type of wheat in the "medium" category.

European soft wheats, U.S. Soft Red Winter wheat, U.S. Soft White Wheat, other U.S. wheats,[18] and other wheats[19] are all classified in the soft wheat category. Wheats in this class are used for pastry, crackers, noodles and a

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[17] originally denoted as FAQ (fair average quality).
[18] mainly admixtures
[19] wheat traded by countries other than the five majors

multitude of unleavened applications, or for feed.

The Sequence of Calculation of the Commodity and Market Effects

As noted earlier, Richardson (1971) indicated that the sequence of calculation of the commodity and market effects can be legitimately changed. The sum of the two effects would be the same but by altering the sequence of calculation the individual effects are calculated differently and can take on different magnitudes. In this analysis of global wheat markets, both the standard calculation, $X' - X = \left(\sum_i rX_i - \sum_i X_i\right) + \left(\sum_i r_i X_i - \sum rX_i\right) + \left(\sum_i \sum_j r_{ij} X_{ij} - \sum_i r_i X_i\right) + \left(\sum_i \sum_j X'_{ij} - \sum_i \sum_j r_{ij} X_{ij}\right)$ and the calculation with the effects reversed $X' - X = \left(\sum_i r_i X_i - \sum X_i\right) + \left(\sum_j r_j X_j - \sum rX_j\right) + \left(\sum_i \sum_j r_{ij} X_{ij} - \sum_j r_j X_j\right) + \left(\sum_i \sum_j X'_{ij} - \sum_i \sum_j r_{ij} X_{ij}\right)$ will be made in order to compare the significance of the difference in magnitude between the two calculations, hopefully enabling some conclusions to be drawn as to the sensitivity of the results.

Choice of Classification of Importing Region.

In principle, choice of an appropriate world or market for each competitor, and comparisons made only on the basis of competition within that area (world) should be an important aspect of CMS analysis. Houston (1967) provides an adequate description of the problem in his 1967 analysis of regional growth within the U.S.A.

> .....Shift and Share analysis implicitly assumes that the market area of all goods is national, or uniform if some other base is used. If, in a region, the market area of a good is subnational, as indeed is nearly always true, then it is neither in competition with all other regions producing the same goods, nor can it expect to share in the average U.S. increase in aggregate demand. To be conceptually correct shift and share analysis would have to use the market area of an industry as the base against which growth is measured in that industry.

The rationale behind the selection of a "proper" world is sound. Physical location and/or economic union, in many cases are important considerations in the selection of a "proper" world. For example, a landlocked African nation cannot be compared with a country such as Taiwan with wider access,whether through locational or other infrastructural advantage, to a more diverse marketplace. However, in this analysis of global wheat markets, the "proper" world is taken to be the entire world. The rationale behind this is that the majority of exporting nations and certainly the five major ones identified in this study have roughly equal access to importing nations. The nature of bulk freighter transportation which results in low per unit costs for

transportation of bulk commodities is a significant factor in the global nature of the wheat market. In effect, distance from markets may have become less of a competitive factor over time because of improvements in loading and transportation facilities. The advent of the supertanker may have been particularily significant.

Degree of Market Consolidation.

CMS effects will vary with the degree of market consolidation. In this analysis, markets have been grouped into four different categories based on per capita gross domestic product (GDP). Some oil exporting nations [38] with high per capita GDP were ranked as middle income developing nations because of the disparity of income within the general populace. The four groups used in this analysis are labelled as i)industrialized countries, ii)middle income developing countries, iii)less developed countries and iv)countries with centrally planned economies. A complete list of countries by category is given in the Appendix A.

Choice of a the Base Year

Because the data used in this analysis of global wheat trade is in physical quantity units rather than values, problems associated with having to index the values are avoided. CMS analysis is purports to measure a discrete time period, whereas the CMS identity refers to only one point in

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[38] Saudi Arabia, Kuwait, Bahrain, United Arab Emirates

Choice of a the Base Year

Because the data used in this analysis of global wheat trade is in physical quantity units rather than values, problems associated with having to index the values are avoided. CMS analysis is purports to measure a discrete time period, whereas the CMS identity refers to only one point in time. As Richardson points out and using his terminology in which 's' denotes market share, the identity calculates the commodity effect as $\sum_i s_i^0 X_i - \sum s^0 X_i$, the market effect as $\sum_i \sum_j s_{ij}^0 X_{ij} - \sum_i s_i^0 X_i$, and the competitiveness effect as $\sum_i \sum_j X_{ij}^1 - \sum_i \sum_j s_{ij}$,[1] but, an equally correct analysis could be done by calculating the commodity effect as $\sum s_i^1 X_i - \sum s^1 X_i$, the market effect as $\sum_i \sum_j s_{ij}^1 X_{ij} - \sum_i s_i^1 X_i$, and the competitiveness effect as $\sum_i \sum_j X_{ij}^0 - \sum_i \sum_j s_{ij} X_{ij}$. In fact, neither identity is superior to the other. Baldwin suggests the addition of the interaction effect $\Delta s \Delta X$ to the identity to attempt to account for changes attributable to various different base weightings.

Over the time period under study in CMS analysis, both a country's export structure and world exports are continually changing. One would like to know s_{ij} and X_{ij} at every moment over the period of the study. However, this study uses ten year averages as beginning and end periods for the analysis to reduce the chance of picking a base year

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[1] The superscripts 0 and 1 refer to two separate points in the analysis, presumably but not necessarily, the beginning and the end.

which is not representative of the trend. Period one is an average for the ten year period 1955/56 to 1964/65, period two is an average for the period 1965/66 to 1974/75, and period three is an average for the period 1975/76 to 1984/85.

B. Results of the Analysis

Tables 4.2, 4.3 and 4.4 given in this section of chapter 4 provide a comparison of the results for the thirty year period using the three time periods mentioned previously. Table 4.2 provides results of a comparison of the effects of period 1 (1955/56 to 1964/65), to period 3 (1975/75 to 1984/85). Table 4.3 provides a similar comparison of the effects of period 1 (1955/56 to 1964/65) to period 2 (1965/66 to 1974/75), and Table 4.4 provides a comparison of the effects for period 2 (1965/66 to 1974/75) to period 3 (1975/76 to 1984/85). Two sets of calculations were made for each of the comparisons. Along with the standard CMS calculation, an analysis was performed in which the sequence of the calculation of the commodity composition effects and the market distribution effects are changed (ie. the effects are reversed). The results of both these calculations are provided in the tables.

Table 4.2 provides the estimates of the source of growth in wheat exports for each of the five exporting

nations and for the "other " category. At first glance, two features are evident. Firstly, all countries in the study (the five major exporters and the conglomeration of "others") had positive growth in wheat exports attributable to the world trade effect or the growth in world trade. This is not surprising in view of the substantial increase in wheat trade over the thirty year period of the study. Of the five major exporting regions Canada shows the largest percentage gain from the growth in world trade although the U.S.A. had a higher absolute gain. One is tempted to attribute this to a growth in demand for the hard red spring types of wheat sold by Canada but this may also be due to the increased substitution of these hard wheats (especially the lower end of the grade spectrum) in applications where medium protein or soft wheats are traditionally used.

The commodity effect or the impact of the commodity composition of wheats was somewhat variable for the major exporters for all the time periods. The calculation of the commodity and market effects reversed gave no sign changes and in most cases the discrepancies between the two calculations were relatively insignificant. However, as Table 4.2 shows, Canada, with a commodity effect amounting to -21.7% or -1,443,000 tonnes from the initial calculation, and -80.2% or -5,321,000 tonnes with the effects reversed, exhibited a significant difference as did the other countries category with results of 73.7% and 119.2% respectively. Argentina at -15% from the first calculation

and -8.3% with the effects reversed or an aggregate change of 177,000 tonnes, Australia at -6% and -4.9% or an aggregate change of 80,000 tonnes and the E.E.C. at 10.2% and 11.2% or an aggregate change of 73,000 tonnes were relatively unchanged by the reversal of the calculation of the effects. The U.S.A. at 1.8% and 16% was relatively unchanged in percentage terms but in absolute terms displayed a change of almost 3 million tonnes.

The results of the commodity effect or commodity composition effect was negative for Canada, Argentina and Australia. In absolute terms the negative effect attributed to Canada is particularly evident. For the E.E.C. and the U.S.A. the effect was small but positive and it was the largest for "others". This tendency may be explained by the relatively recent emergence of the E.E.C. as a major exporter of wheats and the concentration of European production in the soft and medium wheats.

Canada and Argentina which concentrate on hard red spring wheat production and Australia which concentrates on production of medium type milling wheats may have been more restricted by a marketplace with increasingly diverse demands. The market effects in most instances are not substantially affected by the reversed calculation of the market and commodity effects. Argentina at 7.2% from the initial calculation, and .5% calculated with the effects reversed or a change of 177,000 tonnes in absolute terms, Australia at -24% and -24.8% respectively or a change of

80,000 tonnes in absolute terms, the E.E.C. at 40.6% and 39.6% or a change of 74,000 tonnes in absolute terms and the "others" category at -115.7% and -161.2% or a change of 657,000 tonnes in absolute terms exhibit no sign changes and in three of the cases the magnitude of the change is relatively insignificant. The U.S.A. at 13% from the initial calculation and -1.2% calculated with the effects reversed or an absolute change of 2,911,000 tonnes although exhibiting a sign change could still be classified as insignificant because of the relatively small magnitude of the change in percentage terms. Canada exhibits a sign change as well as a substantial change in magnitude between the initial calculation and the calculation with the effects reversed.

The market effects in Table 4.2 indicate that the changes from the reversal of the calculation of the effects were minimal with the exception of Canada. Indeed, Australia with market effects of -24% from the initial calculation and -24.8% with the effects reversed; and, the E.E.C. with effects of 40.6% from the initial calculation and 39.6% with the effects reversed, were almost unchanged. The "others" category displayed a change with the effects calculated in reverse but the direction of the change was the same and the size of the change could not be considered large enough to negate the asssumptions of the analysis.

From the calculations it appears that the E.E.C. gained the most from changes in global wheat market distribution.

The rise of the Soviet Union and several Eastern bloc nations as importers of wheat and the rise of the E.E.C. as a major exporting entity were coincidental and may explain the impact of the market distribution effect for the E.E.C. from period 1 to period 3. Of the five major exporters, Australia shows the greatest loss from the market distribution effect from period 1 to period 3, possibly due to its geographical isolation from traditional importers and the decline in purchases by these historically allied nations.

The impact of the market distribution effects for Argentina at 7.2% and the U.S.A. at 13% are positive. From the calculation with the effects reversed, Argentina at .5% or an absolute market effect of 13,000 tonnes, and the U.S.A. at -1.2% or an absolute effect of -251,000 tonnes display only marginal impacts. From the initial calculation, the results show that both countries benefitted from market distribution although the benefit is relatively small. The magnitude of change between the initial calculation and the calculation with the effects reversed is very small suggesting that the impact from the market distribution for these two nations is negligible to marginally positive.

The magnitude of the change in the market distribution effect for Canada with impacts of -3.8% and 54.6% with the effects reversed or, an absolute change of 3,878,000 tonnes, shows significant disparity. If one were to accept -3.8% as the impact then it would be satisfactory to assume that the

change in market distribution has had little impact on exports of Canadian wheat. If we accept 54.6% as the impact, one would have to assume that market distribution has been favorable for Canadian wheat exports. Upon reflection, Canada has likely gained through changes in market distribution due to her proximity to the growing Asian market. On the other hand, Canada has also suffered from losses in traditional European markets, especially in the last ten years. Tempering the whole market distribution impact is the tremendous increase in transportation technology and efficiency. Decreased per unit transportation cost has likely made the geographical distribution less important for Canada. Political affiliation has however remained a factor.[33]

The most striking factor in Table 4.2 is the positive impact of the competitive effect for all countries. Australia at 117.1% and Canada at 99.2% showed the largest pecentage gains due to the competitiveness factor, although in terms of absolute magnitude the U.S.A. displayed the greatest gain with almost 15 million tonnes being attributed to the competitive effect. Argentina at 89.6% and the U.S.A. at 72.6% were not far behind Australia and Canada in percentage gain. The E.E.C. at 41.7% showed the smallest gain due to competitiveness although in terms of absolute increase , they were ahead of Argentina with over 3 million

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[33] For instance, Cuba, a significant importer of Canadian wheat, does not purchase grain from its nearest neighbor, the U.S.A..

tonnes being attributed to the competitive effect.

Table 4.3 provides a summary of the CMS analysis for time period 1 (1955/56 to 1964/65) and time period 2 (1965/66 to 1974/75). The most striking feature of Table 4.3 is the significant negative impact of the world trade effect on all exporting countries between these two periods. This general impact could partially be as a result of the low level of increase in total global wheat trade between the two time periods. The significant negative impact in the case of Argentina can be attributed to that country's decrease in exports to industrialized nations and the relatively small increase to middle income developing countries in comparison to total wheat trade to those nations. Canada at -231% or an absolute effect of -5,398,000 tonnes also suffered from declines in exports to industrialized countries between the two periods. All exporting nations except the U.S.A. experienced stable to declining wheat exports to industrialized nations between these two ten year periods. U.S.A. exports increased over this time period.

The commodity composition effect in percentage terms is significantly negative for Argentina at -200% from the initial calculation and -53% calculated with the effects reversed. Canada, as well, has a significant negative impact in percentage terms at -27% initially and -85% with the effects reversed. In absolute terms, Canada suffered the greatest negative impact with a -631,000 tonne impact from

the initial calculation and 1,975,000 tonne impact when calculated with the effects reversed. Because Argentina and Canada export mainly hard red spring types of wheat one could conclude from the significant negative commodity effects that the growth in global trade in wheat between the two periods was more concentrated in medium protein and softer wheat types. The commodity effect for Australia could be considered neutral in that the magnitude of the change with the effects reversed is small even though a sign change takes place. The effect for the U.S.A. and the E.E.C. (as well as the "others" category) are positive. This gives an indication of the the influence of changes in the composition of wheat types on U.S. and E.E.C. growth in market share. One might conclude that the U.S.A. and E.E.C. have specialized in wheat types for which international trade grew more rapidly between these two time periods.

The market effects in Table 4.3 vary somewhat between the initial calculation and the calculation with the effects reversed. The E.E.C. at 9% and 12% respectively had a positive impact under both methods of calculation and can be interpreted as having gained from exporting to more rapidly growing markets (i.e. the middle income and centrally planned markets). Australia with market effects of -8.08% and -19.69%, with reversed effects, suffered from exporting to areas with declining markets. The U.S.A. had a sign change with the effects reversed although the magnitude of the change in percentage terms is relatively small. The

change in sign for both Canada and Argentina as well as the magnitude of the change indicate a substantial variation between the two methods of calculation. Canada was calculated to have a small negative impact (-5.7%) under normal order of calculation to a significant positive impact (51.9%) with the effects reversed. In absolute terms the impact went from a 132 thousand tonne negative impact to over a 1.2 million tonne positive impact. Argentina, on the other hand, had a significant positive impact (118.9%) under standard calculation and a negative impact (-28%) with the effects reversed although the absolute magnitude of the change is not as large as the magnitude for Canada. The large discrepancy between the two methods of calculation questions the validity of these particular calculations. However, because the impacts of the world trade effect and the competitive effect are so significant, the discrepancies between the two methods of calculation for the commodity and market effect are not considered large enough to completely invalidate the results.

The substantial positive impact of the competitive effect is a striking feature of Table 4.3. Argentina with a positive impact of 1892.8% is the clear leader in this category, while Canada is a relatively distant second at 364%. The U.S.A. at 211.9%, Australia at 209%, and the E.E.C. at 51.8% all show substantial positive impacts. However, in absolute terms, The U.S.A. and Canada clearly show the greatest gains from the competitive effect. The

large positive effect attributable to Argentina might be explained by the decline in global demand for hard wheat types such as those exported by Argentina and the simultaneous success Argentina has had selling wheat on global markets. This is also an indication that there may be a high degree of substitutability between the three wheat types as categorized in this study and that Argentina with a chronic need for foreign exchange is willing to price product relatively low in order to clear stocks. Regardless, Argentina appears to have done a creditable job of marketing wheat between period 1 and period 2 in view of the large negative impact suffered due to the world trade effect. The U.S.A. and Canada, with the largest absolute gains due to the competitiveness effect, more than offset substantial negative impacts attributed to the world trade effect.

Table 4.4 provides a summary of CMS analysis between period 2 (1965/66 to 1974/75) and period 3 (1975/76 to 1984/85). Once again, from period 2 to period 3 all exporters suffered a negative impact from the world trade effect although not to the same degree as from period 1 to period 2.

Canada suffered the largest negative impact from the world trade effect at -134.5% and the second largest absolute negative impact. This would indicate that Canada did not benefit from a general rise in world exports. Also, Australia at -89.4%, the U.S.A. at -73%, Argentina at -51.7% and the E.E.C. at -50.1% similarly did not benefit from the

rise in wheat exports between the two periods. The U.S.A. with a -10 million tonne impact and Canada with a -6 million tonne impact clearly benefitted least in absolute terms.

The impact of the commodity effect was relatively small for the five major exporters in percentage terms. With the calculations performed with the effects reversed, the magnitude of the change was relatively small and in only one case (Argentina) was there a reversal of sign, although again the magnitude of the change was small. Of the five major exporters, Canada had the largest negative impact from the commodity effect, suggesting that the wheat export structure for Canada was relatively concentrated in low growth wheats. Conversely, the E.E.C. had the most favorable impact from the commodity effect suggesting that growth was due to concentration in higher growth wheats. Australia at -27.4% from the initial calculation and -19.7% with the effects reversed, also clearly suffered from concentation in lower growth wheats. The U.S.A. showed negative impacts as well although the effect was relatively small. Argentina, with a small negative impact from the initial calculation (-3.9%) and a small positive impact (4.2%) with the effects reversed, had no clear impact due to the commodity effect.

The impact of the market effects are quite variable but with the effects reversed the impacts are relatively unchanged, with the exception of Canada. Argentina at 17.5% from the initial calculation and 7.2% with the effects reversed, had the greatest impact from having its export

structure concentrated in high-growth areas. The U.S.A. with 8.2% and 11.3% with the effects reversed, and the E.E.C. with 7.6% and 3.8% also clearly benefitted from exports to high growth markets. Australia with -27.4% from the initial calculation and -19.7% with the effects reversed suffered the most from concentration in markets with slow growth. Canada had an almost neutral impact at -2.2% but, calculation with the effects reversed showed a substantial positive impact from exporting to higher growth markets. The "Other" countries category had significant negative impacts suggesting that the group of other exporters suffered from selling into low growth markets as well.

In absolute terms, the large negative impact of the market effect for Australia from both the initial calculation and the calculation with the effects reversed indicates that Australia quite clearly suffered unfavorable market distribution effects between period 2 and period 3. At the other extreme, the U.S.A. had a significant absolute gain under both methods of calculation, as did Argentina and the E.E.C.. The market distribution effect for Canada is less clear. From the initial calculation the negative impact is -94,000 tonnes, a relatively small negative impact. From the calculation with the effects reversed, a positive impact of almost 1.2 million tonnes was estimated suggesting that Canada may have gained from favorable market distribution effects.

The residual or competitive effect was postive for the five major exporters but significantly negative for the "others" category in percentage terms. Canada at 246.8% and Australia at 221.9% had the largest positive impacts attributed to competitiveness. The U.S.A. at 165% also had a significant impact due to competitiveness while Argentina at 138.1% and the E.E.C.at 136.1% also exhibited substantial positive effects. On the other hand, The "others" category with a competitive effect of 404.9% was also clearly competitive. The U.S.A. with a competitive effect of almost 23 million tonnes is the leader in absolute terms. Canada with a positive impact of 10.6 million tonnes, Australia with a positive impact of 8.4 million tonnes and the E.E.C. at 7.2 million tonnes all have substantial impacts attributed to competitiveness. Argentina also had a substantial positive impact due to competitiveness at 3.6 million tonnes. The significant factor evident from the results in Table 4.4 is the overwhelming positive impact attributed to the competitive effect for all the focus countries or regions.

TABLE 4.2

Results: Comparison of Period 1 and Period 3
(calculations with effects reversed in brackets)

	Argentina	Australia	Canada	E.E.C.	U.S.A.	others
			Percentage			
World Trade Effect	18.2	12.6	26.4	7.4	12.6	53.5
Commodity Effect	-15(-8.3)	-6(-4.9)	-21.7(-80.2)	10.2(11.2)	1.8(16)	73.7(119.2)
Market Effect	7.2(.5)	-24(-24.8)	-3.8(54.6)	40.6(39.6)	13(-1.2)	-115.7(-161.2)
Competitive Effect	89.6	117	99.2	41.7	72.6	88.4
			Absolute Values (-000-tonnes)			
World Trade Effect	478	798	1751	565	2586	771
Commodity Effect	-394(-217)	-390(-310)	-1443(-5321)	779(852)	366(3277)	1062(1717)
Market Effect	190(13)	-1494(-1574)	-253(3625)	3084(3010)	2660(-251)	-1666(-2321)
Competitive Effect	2351	7436	6581	3171	14848	1273

TABLE 4.3

Results: Comparison of Period 1 and Period 2
(calculations with effects reversed in brackets)

	Argentina	Australia	Canada	E.E.C.	U.S.A.	others
			Percentage			
World Trade Effect	-1711.7	-95.3	-231.3	-74.5	-120.1	-85.7
Commodity Effect	-200(-53)	-5.6(6)	-27(-84.6)	13.7(10.4)	2.7(23.7)	15.8(1.3)
Market Effect	118.9(-28)	-8.1(-19.7)	-5.7(51.9)	8.9(12.2)	5.5(-15.5)	-12.1(2.3)
Competitive Effect	1892.8	208.9	364	151.8	211.9	182
			Absolute Values (-000-tonnes)			
World Trade Effect	-1472	-2459	-5398	-1742	-7970	-2375
Commodity Effect	-172(-46)	-145(155)	-631(-1975)	321(243)	181(1576)	437(37)
Market Effect	102(-24)	-208(-508)	-132(1212)	209(286)	364(-1030)	-335(65)
Competitive Effect	1628	5393	8495	3551	14062	5045

TABLE 4.4

Results: Comparison of Period 2 and Period 3
(calculations with effects reversed in brackets)

	Argentina	Australia	Canada	E.E.C.	U.S.A.	others
			Percentage			
World Trade Effect	-51.7	-89.6	-134.5	-50.1	-73	254.6
Commodity Effect	-3.9 (4.2)	-5.1 (-12.7)	-10.1 (-39.6)	6.4 (10.2)	-.2 (-3.3)	-32.4 (-151.8)
Market Effect	15.2 (7.2)	-27.4 (-19.7)	-2.2 (27.4)	7.6 (3.7)	8.2 (11.3)	283.6 (403.1)
Competitive Effect	140.3	221.9	246.8	136.1	165	-405.9
			Absolute Values (-000-tonnes)			
World Trade Effect	-1312	-3371	-5787	-2635	-10086	3391
Commodity Effect	-98 (106)	-191 (-480)	-433 (-1705)	335 (539)	-23 (-459)	-431 (-2023)
Market Effect	387 (183)	-1031 (-743)	-94 (1178)	401 (197)	1128 (1564)	3778 (5369)
Competitive Effect	3562	8362	10616	7159	22806	-5406

V. SUMMARY AND CONCLUSIONS

This study has attempted to address the problem of determining competitiveness for wheat exporting nations over the last thirty years by trying to measure relative shifts in market shares for the major exporting countries and for the three broad categories of major wheat types, namely, hard, medium and soft wheats. The objective was to determine if there has been an actual shift in market shares for various exporting countries and wheat types, and then attempt to attribute this shift to changing market distribution, commodity composition and/or competitiveness.

The study has focused on the five major wheat exporting countries, three major wheat types and four major importing categories. Constant Market Share analysis (CMS) was the method used to assess the nature of changes in trade flows. The study analyzed three consecutive ten year periods beginning in 1955/56.

This summary will attempt to interpret the findings of the analysis and discuss some of its implications. Suggestions for future research will also be made.

A. General Summary

The main objective of this study was to attempt to identify the competitiveness of the five major wheat exporting nations for a thirty year period using Constant Market Share analysis. A summary of the analysis for the three separate time periods follows. It is appropriate to

emphasize again that CMS analysis suffers from some severe conceptual and applicative problems as discussed earlier in this study, and that any interpretation of results should be approached bearing these limitations in mind.

Period 1/Period 3 comparing 1955/56 to 1964/65 with 1975/76 to 1984/85.

The results of the analysis for this comparison indicate that Australia (117%) and Canada (99.2%) had the highest gains attributable to competitiveness between the 1955/56 to 1964/65 and the 1975/76 to 1984/85 time period, although Argentina (89.6%) and the U.S.A. (72.6%) were not far behind. The E.E.C. (41.7%) showed the poorest gains due to the competiveness factor. The U.S.A. with a positive impact of 14.8 million tonnes had the highest gains attributable to competitiveness in absolute terms, while Australia with a 7.4 million tonne impact and Canada with a 6.6 million tonne impact were in the second and third place respectively. The E.E.C. with a 3.2 million tonne impact and Argentina with a 2.4 million tonne impact had the lowest gains of the five major exporters attributable to the competitive effect.

It would appear that Australia and Canada, which have similar marketing regimes, have maintained market share by being competitive in traditional markets. On the other hand, Canada, Argentina and Australia (to a lesser degree) show poor performance due to commodity composition while the

U.S.A. and the E.E.C. show substantial benefits from commodity composition. These results lead one to conclude that the Hard Red Spring wheats produced by Canada and Argentina, and to a lesser degree the medium quality wheats produced in Australia have not been a positive factor in the wheat export potential for these countries. Conversely, the U.S.A. with its vast amounts of Hard Red Winter Ordinary and Soft White and Red Wheats, and the E.E.C. with its considerable production of soft and medium protein wheats, have benefitted to a greater degree in a marketplace requiring these lower protein wheat types.

Of the five major exporters, Australia suffered the greatest losses due to market distribution in both percentage and absolute terms. The change in traditional markets have likely affected Australian exports to a greater degree than other exporters. Australia's dependency on the European marketplace made her vulnerable to declining European imports. The fact that European bakers needed a high quality wheat to mix with their domestically grown wheat, likely favored Canadian exports and may have been more detrimental to the lower protein Australian exports. Argentina, which exports hard wheats, also showed a slight gain due to market distribution. The U.S.A. with a wide variety of wheat types also exhibited a marginal gain due to market distribution (although with the effects reversed, a slight negative impact was in evidence). The major beneficiary due to market distribution between the two time

periods was the E.E.C. This could partially be explained by the emergence of the E.E.C. as a major grain exporter over the time period in question and her relative proximity to the high growth importing regions in Eastern Europe. As well, political affiliations with third world nations from imperialist days, especially in Africa and Southeast Asia, could have benefited E.E.C. exports. An interesting sidelight to this summary is the magnitude of the positive commodity composition effect and the corresponding magnitude of the negative market distribution effect for the group of "others". In general these countries produce a medium protein or soft, low protein type of wheat. The positive commodity composition effect suggests that these types of wheat enjoyed favorable market demand between the two time periods. The sizeable negative market distribution effect implies loss of traditional markets for this grouping of nations. Whether a meaningful interpretation can be made from the data for this diverse group of exporters is speculative. However, it appears that traditional markets have changed to these nations' detriment, while the global situation has been favorable to the lower and medium quality wheat types produced by these nations.

Period 1/Period 2 comparing 1955/56 to 1964/65 with 1965/66 to 1974/75.

Between time period 1 and 2, Argentina had the largest gains due to competitiveness but at the same time failed to

maintain its share of total world exports as evidenced by the large negative percentage attributable to increased world trade. Also, a substantial negative effect due to commodity composition suggests that additional losses took place because of concentration in low growth wheat types. No clear market distribution result is apparent because of the reversal of signs when the analysis was performed with "reversed effects". What becomes clear when viewing the total result is that although Argentina failed to maintain her market share between period 1 and period 2, and suffered negative effects from commodity composition, she did make gains strictly due to her "competitiveness" or competitive practises.

Canada similarly failed to maintain market share between period 1 and period 2 although not to the same degree as Argentina. Similarly, Canada suffered a negative impact due to commodity composition and an unclear result due to market distribution (again, because of the reversal in signs when calculated with the effects reversed). Like Argentina, Canada could attribute increases in marketings between the two time periods to competitiveness.

Australia likewise did not maintain its share of exports between period one and two, however, Australia did not suffer a negative impact due to commodity composition as did Canada and Australia, suggesting that her exports were concentrated in higher growth wheat types. Australia did, however, suffer a clear negative impact due to market

distribution suggesting that her exports were to slower growth areas. Between time period 1 and 2 any growth in Australian exports can be attributed to her competiveness.

The U.S.A. had gains due to competitiveness of about the same magnitude as Australia in percentage terms. However, the U.S.A. had a clear postive impact due to commodity composition, suggesting that U.S. concentration on production of hard winter ordinary and soft wheat types may have contributed to export gains. The market distribution effect can be interpreted as neutral and as such implies that the U.S.A. neither gained nor lost from concentration on either high or low growth markets, possibly because of the wide global distribution and large number of customers. Again, the largest impact contributing to increased U.S. exports proved to be the competiveness effect.

The E.E.C. showed positive gains from both the commodity composition and the market distribution effects suggesting that her concentration of exports in soft or lower protein wheats and her position with regard to markets were major factors in increasing exports. She also had major gains due to competitiveness although not to the same degree as the other major exports.

Period 2/Period 3 comparing 1965/66 to 1974/75 with 1975/76 to 1984/85.

Between period 2 and period 3, Canada exhibited the largest impact due to competitiveness, closely followed by

Australia. Similarly these two nations suffer clear negative impacts due to commodity composition] suggesting that although the marketing efforts of these nations may be effective, concentration in wheat types with slackening demand has hurt exports. Similarly Argentina and the U.S.A. show no clear impact due to commodity composition suggesting that the hard and medium type wheats which form the bulk of their production have not been a factor in increasing their wheat exports. On the other hand, the E.E.C. shows a clear positive impact due to commodity composition suggesting that concentration on production and exportation of soft wheat types benefitted E.E.C. market shares during the time period in question.

The market distribution effect was positive for Argentina, the U.S.A. and the E.E.C., negative for Australia and unclear for Canada because of a sign reversal when calculated with the effects reversed. The results suggest that Argentina, the U.S.A. and the E.E.C. have concentrated their sales in high growth markets while Australia and Canada have been more active in lower growth markets.

Canada and Australia had the largest gains attributed to competitiveness, perhaps suggesting some success by the two respective wheat boards. The U.S.A., Argentina and the E.E.C. also displayed sizeable gains due to competiveness.

One of the most striking results of the analysis for all three comparisons was the positive impact due to competitiveness for the five major exporters. In all cases

the size of the impact was sufficiently large to be able to positively ascribe competitiveness to each exporter in all cases. In all three analyses Canada proved to be either first or second in the "competitiveness" ranking. Australia as well had rankings of first, second and fourth for the competitiveness effect.

These results may suggest that the respective marketing arms for each country have been relatively successful in their attempts to retain market share and effectively compete in the global marketplace. However, the negative impact due to the commodity composition effect displayed in all cases for Canada, suggests that Canada has concentrated on selling wheat that has a declining demand. That is to say, demand for hard wheat types as a portion of the global trade in wheat has declined and appears to have negatively impacted Canadian wheat exports. Australia also seems to have suffered a marginal negative impact by concentration in wheat types showing slower global growth, although in one case (period 1 vs period 2) the impact could be considered neutral.

The E.E.C. in all three comparisons showed the lowest gains attributable to the "competitive" effects. However, in all cases, gains due to the commodity composition effect were the highest of all the major exporters suggesting that demand for the soft wheats grown by the European countries grew more rapidly than for wheats produced by the other exporters. The E.E.C. also had a consistently positive

impact calulated for the market distribution effect suggesting that much of the growth in E.E.C. exports has been to rapidly expanding markets. Indeed, the growth of the Eastern European market and the proximity of this market to the E.E.C. may have been a major factor contributing to this positive effect.

Argentina has also showed a positive competitiveness effect for all three comparisons but especially so for the period 1 versus period 2 comparison. In that comparison, Argentina showed the largest positive impact due to the competitive effect by a wide margin over second place Canada. With the exception of the period 2 versus period 3 comparison in which the impact could be considered neutral, the commodity composition effect for Argentina was negative. However, the impact of the market distribution effect was positive but very small. From these results it is apparent that Argentina, although maintaining its export share, has suffered from concentration in wheat types characterized by slow growth. The positive market distribution effect likely results from non-reliance on declining Western European markets.

The U.S.A. in two of the comparisons ranked fourth of the five major exporters with regard to the competitive effect, and in the period 1 versus period 2 comparison, ranked third, just slightly ahead of fourth place Australia. The U.S.A. also had a small positive impact due to the commodity composition effect except for the period 2 versus

period 3 comparison in which the impact was negative but small. The market distribution effect, because of sign changes for the calculations with the effects reversed, could be considered neutral to marginally positive for the U.S.A.. The results indicate that the U.S.A. has been competitive but not to the degree that most of her major trading rivals have been. However, it appears that the U.S.A. has partially benefitted from concentration on wheat types for which there is a growing demand. This marginal positive impact due to commodity composition is likely a result of increased production of soft and medium quality wheats in the U.S.A. and correspondingly an increased global demand for these wheat types. However, a significant portion of U.S. wheat production is still of the top grade hard red winter and hard red spring types. This has likely tempered the degree of the impact due to the commodity composition

The three separate analyses performed in this study attempt to explain market shares in detail for the various countries and commodity categories involved. Because the results of the analysis vary to some degree when the commodity composition effects and the market distribution effects are calculated with the effects reversed, there is some risk involved in using a specific result as an absolute indication of reality in the marketplace. It may be more appropriate to make general observations based on an overall assessment of the three individual analyses.

Several observations can be made when looking at the results of this study. These are:

1. the high degree of competitiveness between the five major wheat exporting entities;
2. the significant positive impacts due to commodity composition for countries involved in the exportation of soft wheat types, especially the E.E.C..
3. the significant negative impacts due to the commodity composition effect for countries exporting almost exclusively, hard and medium type wheats (ie. Canada, Argentina, Australia);
4. the significant positive impacts due to market distribution for the E.E.C. and, less strikingly, for Argentina and Canada (evidenced by their involvement in the rapidly expanding Eastern European market);
5. the large magnitude of the positive impacts due to "competitiveness" for Canada and Australia.

From these observations one could conclude that Canada has done a creditable job of marketing hard red spring wheat over the period of the study, especially in light of what

appears to have been a highly competitive marketplace. However, the significant and consistent negative impact due to the commodity composition effect leads one to speculate that it may have been more appropriate to concentrate somewhat more effort on the production and exportation of higher yielding, lower protein wheat types.

There has been doubt expressed as to whether Canada could maintain her reputation as an exporter of high protein wheat if the system were to encourage production of lower protein wheats as well. There is some concern about maintaining purity within grades for the higher protein wheats. However, in light of the substantial increases in demand for lower protein wheats over the last thirty years, it may be necessary to begin to encourage production of these wheat types and attempt to adapt the system so that both high protein and other wheats can be accommodated within the same system. A continuous supply of high protein wheat should not be in jeopardy because areas of the prairies where high protein, hard red spring wheat is produced will continue to grow these wheats because the marginal advantage attributable to 3M wheats would not be obtainable in these areas in most years. However, in areas of the prairies such as the black soil zone where hard red spring wheats are consistently downgraded in quality, substantial advantage may be derived from the production of the lower protein wheats.

With technological advances in varietal identification and type verification, a system which can accommodate both high protein hard red spring wheats and lower protein wheats is feasible and desirable. By discouraging production of lower protein, higher yielding wheats, Canada may have to continue to rely on pricing surplus hard wheats at a level which makes them attractive to importers who are more concerned with energy levels in wheat rather than protein content. The consequences of this policy are likely to reduce income for many Canadian producers.

B. Suggestions for Further Study

As stated earlier, this study was based on a broad aggregation of importing nations categorized by income, as well as a somewhat arbitrary grouping of wheat types. The analysis was intended to identify shifts in market shares and attribute these shifts to commodity or market related effects. The results are based on historical data and should not be used as a conclusive indication of future market performance. Some hypotheses can be drawn from this analysis which give an indication of broad shifts in market share, but in order to be more precise at the individual exporter's level, a more comprehensive analysis would need to further disaggregate the categories of wheat types and importing areas. Future analysis of this type could break down importing entities to the national or country level. In the case of minor importers, groupings could be made on a

geographical basis and according to income level. As well, instead of using the commodity categorizations "hard", "medium" and "soft", a finer aggregation should be used which takes into account specific end use. For example, soft wheats should be divided into at least two categories to accomodate both red and white wheats, as they appear to face different demands. Depending on data availability, a more comprehensive study using finer groupings might give a better understanding of shifts taking place over time in the world markets for wheat.

BIBLIOGRAPHY

Abbot, P. C., "Modeling International Grain Trade with Government Controlled Markets," *American Journal of Agricultural Economics* 61(1979): pp.21-31.

Alaouze, Chris M., A. S. Watson and N. H. Sturgess, "Oligopoly Pricing in the World Wheat Market." *American Journal of Agricultural Economics* 60 (1978) pp.173-85.

Armington, P. S., "The Geographic Pattern of Trade and the Effects of Price Changes," *International Monetary Fund, Staff Papers*, XVI (July 1969) pp.159-75.

Armington, P. S., "A Theory of Demand for Products Distinguished by Place of Production," *IMF Staff Papers* 16(1969) pp. 159-78.

Australian Wheat Board; *Australian Wheat Board Annual Report* var. years.

Baldwin, R. E., "The Commodity Composition of Trade: Selected Industrial Countries, 1900-1954," *Review of Economics and Statistics*, XL (Feb. 1958, Supplement), pp.50-71.

Briggs, K. G., Factors Affecting the Development of Utility Wheats for Alberta, *Agriculture and Forestry Bulletin #2* University of Alberta 1978.

Byerlee, Derek, *The Increasing Role of Wheat Consumption and Imports in the Developing World* CIMMYT Working Paper No. 5, Mexico City 1983.

Canada Grains Council, *The Structure of the Feed Grain Market in Western Canada* Canada Grains Council, Winnipeg, Man., March 1985.

Canada Grains Council, *Grain Grading for Efficiency and Profit* Grain Grading Committee, Canada Grains Council, Winnipeg, Manitoba, Sept. 1982.

Canada Grains Council, *Wheat Grades for Canada Maintaining Excellence* Grain Grading Committee, Canada Grains Council, Jan. 1985.

Canada Grains Council, Canada Grains Council, Winnipeg, Man. 1982.

Canadian International Grains Institute, *Grains and Oilseeds: Handling, Marketing, Processing.* CIGI. Winnipeg, Man., 1982

Canadian Wheat Board, *Canadian Wheat Board Annual Report;* C.W.B., Winnipeg, Man., various years.

Capel, R. E. and L. R. Rigaux, "Analysis of Export Demand for Canadian Wheat", *Canadian Journal of Agricultural Economics*, 22 (1974): 1-14.

Carter, C. A., R. M. A. Loyns and Z. F. Ahmadi-Esfahani, "Varietal Licensing Standards and Canadian Wheat Exports" *Canadian Journal of Agricultural Economics* 34 (Nov. 1986):361-377

Chalmers, James A. and Terrance Beckhelm, Shift and Share and the Theory of Industrial Location. *Regional Studies*, Vol. 10, pp.15-23. Pergamon Press, Great Britain 1976.

Cheplo, Nandor J. *World Wheat Trade by Origin and Destination.* U.S.D.A. Economic Research Service Staff Report #AGE 820712.

Creamer, D., "Shifts of Manufacturing Industries ," in *Industrial Location and Natural Resources.* Washington: U.S. National Resources Planning Board paper, (1943).

Grennes, T., P. R. Johnson and M. Thursby, *The Economics of World Grain Trade.* Praeger Publishers, New York, N. Y. 1977.

Houston, D. B., The Shift and Share Analysis of Regional Growth: A Critique, *Southern Economic Journal* 33(1967): 577-581

Irvine, G. N., *The History and Evolution of the Western Canadian Wheat Grading and Handling System.* Canadian Grain

Commission, Winnipeg, Man., 1983.

International Wheat Council, *World Wheat Statistics*, various years, London, Eng..

Konandreas, Panos and Hernan Hurtado, "Analysis of Trade Flows in the International Wheat Market", *Canadian Journal of Agricultural Economics* Vol. 26(3), 1978: 11-23.

Lamfalussy, A., *The United Kingdom and the Six*, Richard D. Irwin and the Yale University Growth Centre, Homewood, Illinois 1963.

Leamer, E. E. and R. M. Stern, *Quantitative International Economics*, Allyn and Bacon, Boston, Mass. 1970.

Lichtenberg, R. M., *One-Tenth of A Nation*, Harvard University Press, Cambridge, Mass. 1960.

Loyns, R. M. A., Colin Carter, M. Kraut, W. Bushuk, J. R. Jeffrey and Z. Fredoun Ahmadi-Esfahani, *Constraints to Biotechnological Developments in Canadian Grains with Special Reference to Licensing of Varieties*. Report submitted to the Science Council of Canada by Prairie Horizons Ltd., Winnipeg, Man., April 1984.

Macdonald, A. A., *Wheat Grading Systems of Major Exporting Countries*. Paper presented to the Nineteenth International Grain Industry Course; Canadian Grain Commission, May 30, 1984.

McCalla, Alex F. "A Duopoly Model of World Wheat Pricing" *American Journal of Agricultural Economics*, 48 (Aug. 1966): 711-27.

McKeague, D., *Canadian Grain Grades and Vancouver Terminals*, M. Sc. Thesis, University of Alberta, 1985.

Oleson, B. T. and H. Brooks, *Prospects for Change in Cereal Grain Production and Trade*. Paper presented to Future Prospects for World Agricultural Policies and Trade: Implications for Western Canada., proceedings from a conference at the University of Saskatchewan, Saskatoon, Sask., Nov. 1984.

Paraskevopoulos, C. C., "Patterns of Regional Economic Growth" *Regional and Urban Economics* 4(1974) 77-105.

Perkins, Peter, Peter Sniekers and Jane Geldard. Commercial Link between Australian and U. S. Wheat Prices. *Quarterly Review of the Rural Economy* 6(4), Nov. 1984: 321-329.

Richardson, J. D., Constant-Market-Share Analysis of Export Growth, *Journal of International Economics* 1(1971): 227-39.

Richardson, J. D., Some Sensitivity Tests for a "Constant-Market-Shares" Analysis of Export Growth, *The Review of Economics and Statistics* 53(1971): 300-304.

Rigaux, L. R., "Market Share Analysis Applied to Canadian Wheat Exports" *Canadian Journal of Agricultural Economics* 19(1971):22-34

Stern, R. M., *Foreign Trade and Economic Growth in Italy, Frederick A. Praeger, New York, N. Y. 1967.*

Spiegelglas, S., "World Exports of Manufactures, 1956 vs. 1937," The Manchester School XXVII (May 1959): 111-39.

Thompson, Robert L., *A Survey of Recent U. S. Developments in International Agricultural Trade Models*, United States Department of Agriculture, Economic Research Service, Washington, D. C., Sept. 1981.

Tyszynski, H., "World Trade in Manufactured Commodities, 1899-1950,*The Manchester School* 19(1951): 272-304.

Ulrich, Alvin and W. Hartley Furtan, *An Economic Evaluation of Producing HY320 on the Prairies.* Department of Agricultural Economics, University of Saskatchewan; Saskatoon, Sask. 1984.

Veeman, Michele M., "Hedonic Price Functions for Wheat in the World Market: Implications for Canadian Wheat Export Strategy", *Canadian Journal of Agricultural Economics*, 35(1987): 535-52.

Veeman, Michele M., *International Wheat Markets: Shares, Trends, and Some Implications for Canada*, Agriculture and

Forestry Bulletin, University of Alberta, Summer 1987.

Weaver, G. D., M. J. Nilsson and R. E. Turney, *Prospects for the Prairie Grain Industry 1990*, Canada Grains Council, Winnipeg, Manitoba; Nov. 1982.

Wheat Advisory Committee, *The International Wheat Situation*, The Secretariat, Wheat Advisory Committee, Bush House, London, Eng. W. C. 2 (Jan. 10, 1939).

Williams, A. (editor), *Breadmaking: The Modern Revolution* British Arcady Co., Hutchinson Benham Ltd. London, Eng..

Wilson, William W. and David A. Berg. *Price Relationships between Hard Red Spring and Hard Red Winter Wheats in the United States.* Dept. of Agricultural Economics, North Dakota Agricultural Experiment Station, North Dakota State University, Fargo, North Dakota (Aug. 1982)

World Bank, *World Development Report 1984* Oxford University Press, London, Eng., 1984.

Zwart, A. C., and K. D. Meilke, "The Influence of Domestic Pricing Policies and Buffer Stocks on Price Stability in the World Wheat Industry," *American Journal of Agricultural Economics* 61(1979): 434-47.

Appendix A

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TABLE 1

Exports of Wheat and Wheat Flour by Principal Exporter
-000-tonnes

year*	Arg.	Aust.	Canada	U.S.A.	E.E.C.	Other	Total
1961	2,377	6,277	9,653	19,541	3,325	6,012	47,185
1962	1,806	4,788	8,909	17,364	3,920	6,272	43,059
1963	2,777	7,813	16,101	23,106	3,816	3,097	56,710
1964	4,443	6,469	10,839	19,596	5,444	2,519	49,310
1965	7,948	5,681	15,897	23,405	5,465	4,621	63,017
1966	3,059	6,984	14,005	20,194	4,177	6,671	55,090
1967	1,370	7,011	9,127	20,494	4,350	9,305	51,657
1968	2,785	5,369	8,305	15,023	5,020	9,097	45,599
1969	2,108	7,250	9,380	16,792	7,167	8,695	51,392
1970	1,704	9,492	11,819	20,140	3,105	8,591	54,851
1971	1,328	8,736	13,684	16,901	4,656	7,191	52,496
1972	3,510	5,562	15,681	31,734	6,525	5,041	68,053
1973	1,106	5,509	11,436	31,273	5,467	8,184	62,975
1974	2,178	8,049	10,776	28,304	7,122	6,516	62,945
1975	3,111	8,072	12,334	31,669	7,729	3,953	66,868
1976	5,584	8,357	13,434	26,080	3,912	4,643	62,010
1977	2,670	11,144	16,030	31,538	4,479	6,677	72,538
1978	3,307	7,246	13,081	32,311	7,349	7,906	71,200
1979	4,748	15,364	15,886	37,198	10,271	4,063	87,530
1980	3,932	11,088	16,259	41,936	12,684	7,254	93,153
1981	4,281	11,405	18,445	48,776	13,990	3,984	100,881
1982	7,471	8,530	21,367	39,939	14,084	5,630	97,021
1983	9,637	11,554	21,764	38,860	15,040	4,642	101,497
1984	7,966	15,090	17,540	38,092	17,234	6,488	102,410
1985	6,197	16,014	17,683	25,000	14,335	3,981	83,210

* signifies the year in which the crop year begins.

source: International Wheat Council

TABLE 2

WHEAT EXPORTS BY COUNTRY, 1945 TO 1985
-000-tonnes

	ARG.	AUST.	CANADA	U.S.A.	OTHER	TOTAL
1930-39 avg.	3,537	3,102	5,469	2,041	5,170	19,319
1945	1,850	980	10,150	10,612	0	23,592
1946	1,633	1,279	6,231	10,803	1,170	21,116
1947	2,776	2,612	5,578	13,197	1,116	25,279
1948	1,660	3,320	6,122	13,714	2,259	27,075
1949	2,367	3,102	6,313	8,136	2,558	22,476
1950	2,803	3,456	6,150	9,959	3,265	25,633
1951	816	2,694	9,388	12,925	3,129	28,952
1952	789	2,694	10,449	8,626	4,082	26,640
1953	2,993	1,932	7,565	5,905	5,252	23,647
1954	3,592	2,531	6,884	7,456	5,959	26,422
1955	30,048	2,776	8,272	9,415	6,694	57,205
1956	2,694	3,429	7,347	14,939	7,265	35,674
1957	2,122	1,687	8,626	10,939	9,034	32,408
1958	2,803	2,041	8,163	12,027	10,776	35,810
1959	2,122	3,320	7,619	13,850	10,068	36,979
1960	1,932	4,980	9,306	17,986	8,707	42,911
1961	2,340	6,313	7,211	19,537	96,877	132,278
1962	1,796	4,952	8,980	17,361	10,667	43,756
1963	2,776	7,810	15,020	23,102	7,619	56,327
1964	4,435	6,476	11,918	19,592	8,762	51,183
1965	7,946	5,687	14,884	23,401	10,612	62,530
1966	3,048	6,993	14,830	20,190	11,265	56,326
1967	1,361	7,020	9,143	20,490	14,585	52,599
1968	2,776	5,361	8,327	15,020	13,442	44,926
1969	2,122	7,238	9,415	16,789	15,429	50,993
1970	1,741	9,497	11,837	20,136	10,912	54,123
1971	1,333	8,735	13,714	16,898	11,755	52,435
1972	3,510	5,551	15,701	31,728	10,748	67,238
1973	1,106	5,509	11,436	31,273	13,651	62,975
1974	2,178	8,049	10,776	28,304	13,638	62,945
1975	3,111	8,072	12,334	31,669	11,682	66,868
1976	5,584	8,357	13,434	26,080	8,555	62,010
1977	2,670	11,144	16,030	31,538	11,156	72,538
1978	3,307	7,246	13,081	32,311	15,255	71,200
1979	4,748	15,364	15,886	37,198	14,334	87,530
1980	3,932	11,088	16,260	41,936	19,938	93,154
1981	4,281	11,405	18,445	48,776	17,974	100,881
1982	7,471	8,530	21,367	39,939	19,714	97,021
1983	9,637	11,554	21,764	38,860	19,682	101,497
1984	7,966	15,090	17,540	38,092	23,722	102,410
1985	6,197	16,014	17,683	25,000	18,316	83,210

source: Canadian Wheat Board

TABLE 3

CANADIAN WHEAT YIELDS, 1921 TO 1986
bushels/acre

	Sask.	Western Canada	Canada
1921	13.9	12.6	12.9
1922	20.3	17.7	17.8
1923	21.2	21.7	21.7
1924	10.2	11.2	11.9
1925	18.8	18.6	19
1926	16.2	17.5	17.8
1927	19.5	21.2	21.4
1928	23.3	23.5	23.5
1929	11.1	11.5	12
1930	14.4	16.6	16.9
1931	8.8	11.8	12.2
1932	13.6	16	16.3
1933	8.7	10.4	10.8
1934	8.6	11.3	11.5
1935	10.8	11.3	11.7
1936	7.5	8.1	8.6
1937	2.6	6.4	7
1938	10	13.5	13.9
1939	19.1	19.1	19.5
1940	17.1	18.5	18.8
1941	12	14	14.3
1942	24.7	25.6	25.8
1943	15.2	16.7	16.9
1944	18.3	17.9	18.3
1945	12.4	13.1	13.6
1946	14.6	16.6	16.9
1947	12.2	13.7	14
1948	13.3	15.6	16.1
1949	11.8	12.9	13.4
1950	16.5	16.6	17.1
1951	20.8	21.7	21.9
1952	27	26.7	26.8
1953	23.3	23.7	24
1954	10.2	12.3	13
1955	22.7	22.6	22.9
1956	24.4	25	25.2
1957	16.6	17.8	18.2
1958	15	17.3	18
1959	16	17.9	18.2
1960	20.7	20.8	21.1

1961	8.5	10.6	11.2
1962	20.4	20.8	21.1
1963	27.5	26	26.2
1964	18.1	19.9	20.2
1965	21.6	22.7	22.9
1966	27.7	27.7	27.9
1967	17.2	19.4	19.7
1968	19.6	21.8	22.1
1969	27	26.7	26.9
1970	26.2	26	26.6
1971	26.7	27	27.3
1972	23.5	24.7	25
1973	24	24.8	25.1
1974	21	21.6	22.1
1975	25.6	26.5	26.5
1976	31.3	30.9	30.9
1977	29.4	28.8	28.8
1978	29.4	29.5	29.5
1979	21.7	23.6	23.8
1980	23	25.2	25.4
1981	27.7	29.6	29.7
1982	30.7	31.6	31.6
1983	26.9	28.3	28.4
1984	211.7	23.9	24.1
1985	24.5	27	27.1
1986	31.6	32.6	32.7

source: Statistics Canada

TABLE 4

WHEAT EXPORTS FOR THREE CONSECUTIVE TIME PERIODS BY ECONOMICALLY DEFINED IMPORTING REGIONS(-000-tonnes).

Figures in the table are averages derived from ten years of data.

Period 1 -1955/56 to 1964/65 HARD: Arg. MEDIUM: Aust. SOFT: EEC
Period 2 -1965/66 to 1974/75 Can. USHRW USSRW
Period 3 -1975/76 to 1984/85 USDHS USSW
OtherUS

INDUSTRIALIZED NATIONS

	ARG	AUST	CAN	EEC	OTHER	USDHS	USHRW	USSRW	USSW	OTHERUS	HARDTOT	MEDTOT	SOFTTOT	GRANDTOT
PERIOD 1	1181	1465	6011	908	1156	343	1381	563	1016	171	7535	2847	3813	14196
PERIOD 2	605	1715	4506	909	935	1267	2018	166	933	629	6378	3733	3572	13683
PERIOD 3	275	1134	3686	285	198	2119	1750	208	1137	558	6080	2885	2385	11350

MIDDLE INCOME DEVELOPING NATIONS

	ARG	AUST	CAN	EEC	OTHER	USDHS	USHRW	USSRW	USSW	OTHERUS	HARDTOT	MEDTOT	SOFTTOT	GRANDTOT
PERIOD 1	1246	1169	1276	1458	897	406	3506	628	953	145	2927	4675	4080	11682
PERIOD 2	1395	2932	1957	3226	2031	1538	5230	968	1429	501	4889	8162	8154	21205
PERIOD 3	2025	5471	4210	5742	2479	2683	8961	2610	3029	1117	8918	14431	14977	

LESS DEVELOPED COUNTRIES

	ARG	AUST	CAN	EEC	OTHER	USDHS	USHRW	USSRW	USSW	OTHERUS	HARDTOT	MEDTOT	SOFTTOT	GRANDTOT
PERIOD 1	171	1491	995	311	89	43	2501	18	1160	0.3	1209	3992	1579	6780
PERIOD 2	408	2008	3241	737	507	434	2423	679	1035	27	4084	4432	2985	11500
PERIOD 3	669	2716	3672	1802	646	186	1378	2962	1411	11	4527	4094	6832	15453

CENTRALLY PLANNED EUROPEAN ECONOMIES

	ARG	AUST	CAN	EEC	OTHER	USDHS	USHRW	USSRW	USSW	OTHERUS	HARDTOT	MEDTOT	SOFTTOT	GRANDTOT
PERIOD 1	26	258	1340	428	2092	2	1085	141	47	98	1367	1343	2806	5516
PERIOD 2	302	309	2252	572	3533	2	1445	9	44	67	2556	1754	4225	8534
PERIOD 3	2280	1412	4690	2875	2351	4	4092	352	18	81	6973	5505	5678	18155

TABLE 5

GROUPINGS OF IMPORTING COUNTRIES USED IN THE ANALYSIS

LESS DEVELOPED COUNTRIES (low income economies)

Chad, Bangladesh, Ethiopia, Nepal, Mali, Burma, Zaire, Malawi, Upper Volta, Uganda, India, Rwandi, Burundi, Tanzania, Somalia, Haiti, Benin, Central African Republic, China P.R.C., Guinea, Niger, Madagascar, Sri Lanka, Togo, Ghana, Pakistan, Kenya, Sierra Leone, Afghanistan, Bhutan, Lao P.D.R., Mozambique, Viet Nam.

MIDDLE-INCOME DEVELOPING COUNTRIES (includes oil exporting nations*)

Sudan, Mauritania, Yemen (PDR), Liberia, Senegal, Yemen Arab Rep., Lesotho, Bolivia, Indonesia, Zambia, Honduras, Egypt, El Salvador, Thailand, Papua New Guinea, Philippines, Zimbabwe, Nigeria, Morocco, Cameroon, Nicaragua, Ivory Coast, Guatemala, Congo (People's Rep.), Costa Rica, Peru, Dominican Republic, Jamaica, Ecuador, Turkey, Tunisia, Colombia, Paraguay, Angola, Cuba, Korea (Rep. of), Panama, Chile, Brazil, Mexico, Algeria, Portugal, Argentina, Uruguay, South Africa, Yugoslavia, Venezuela, Greece, Israel, Hong Kong, Singapore, Trinidad and Tobago, Iran, Iraq, Oman*, Libya*, Saudi Arabia*, Kuwait*, United Arab Emirates*.

INDUSTRIAL MARKET ECONOMIES (Industrialized Countries)

Ireland, Spain, Italy, New Zealand, United Kingdom, Austria, Japan, Belgium, Finland, Netherlands, Australia, Canada, France, Germany (Fed. Rep.), Denmark, United States, Sweden, Norway, Switzerland.

CENTRALLY PLANNED ECONOMIES (Eastern European non-market economies)

Hungary, Romania, Albania, Bulgaria, Czechoslovakia, German Dem. Rep., Poland, U.S.S.R..

APPENDIX B

Results of the Analysis

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Explanation of Symbols Used in the Analysis*

Xj = Xi = focus country's exports in the base period.

X'j = X'i = focus country's exports in the second period.

sj = focus country's growth rate in a particular importing region

sjXj = focus country's expected exports in a particular importing region.

sXj = focus country's expected exports aggregated by region.

si = focus country's growth rate in a particular commodity group.

siXi = focus country's expected exports by commodity category.

sXi = focus country's expected exports by commodity, based on aggregated share.

jSsijXij = focus country's expected exports calculated by region and by commodity aggregated by importing regions.

iSjSXij = focus country's exports aggregated by commodity and importing region in the base period.

iSjSX'ij = focus country's exports aggregated by commodity and importing region in the second period of the comparison.

s = growth rate for focus country's total world exports.

iSsiXi = focus country's expected exports aggregated by commodity

jSsjXj = focus country's expected exports aggregated by importing region.

jSsXj = focus country's expected exports aggregated over the importing regions.

iSsXj = focus country's expected exports aggregated over the commodity categories.

iSjSsjSij = focus country's expected total exports based on shares calculated by importing region.

iSjSsijXij = focus country's expected total exports based on shares calculated by commodity and by importing region.

* this analysis uses the methodology developed by Stern (Leamer and Stern, 1970)

TABLE 1

ARGENTINA, Results of Period 1 vs. Period 3.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	1181	275	-0.2	-236	1396	-228
MID INC.	11682	38326	1246	2025	2.281	2842	1473	2551
LDC	6780	15453	171	669	1.279	219	202	469
CEN PLAN	5516	18155	26	2280	2.291	60	31	107
TOTAL	38174	83284	2624	5249	1.182	2885	3102	2898
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	2624	5249	1.032	2708	3102	2898
MEDIUM	12857	26915			1.093			0
SOFT	12278	29872			1.433			0
TOTAL	38173	83285	2624	5249	1.182	2708	3102	2898
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

ARGENTINE increase in trade between period 1 and period 3

X' - X	2625	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	478	18.2
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	-394	-15.0
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	190	7.2
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	2351	89.6

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 2

AUSTRALIA: Results of Period 1 vs. Period 3

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	1465	1134	-0.2	-293	1732	19
MID INC.	11682	38326	1169	5471	2.281	2666	1382	2440
LDC	6780	15453	1491	2716	1.279	1907	1762	38
CEN PLAN	5516	18155	258	1412	2.291	591	305	800
TOTAL	38174	83284	4383	10733	1.182	4871	5181	3297
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498			1.032			0
MEDIUM	12857	26915	4383	10733	1.093	4791	5181	3297
SOFT	12278	29872			1.433			0
TOTAL	38173	83285	4383	10733	1.182	4791	5181	3297
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

AUST. increase in trade between period 1 and period 3		
X' - X	6350	100%
DUE TO INCREASED WORLD TRADE		
iSsXi-SXi	798	12.6
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	-390	-6.1
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	-1494	-23.5
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	7436	117.1

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 3

CANADA: Results of Period 1 vs. Period 3.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) 5*3 sjXj	(7) s*3 sXj	(8) isijXij
MARKET								
IND.	14196	11350	6011	3686	-0.2	-1202	7105	-1160
MID INC.	11682	38326	1276	4210	2.281	2911	1508	2612
LDC	6780	15453	995	3672	1.279	1273	1176	2730
CEN PLAN	5516	18155	1340	4690	2.291	3070	1584	5495
TOTAL	38174	83284	9622	16258	1.182	6052	11373	9677
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	9622	16258	1.032	9930	11373	9677
MEDIUM	12857	26915			1.093			
SOFT	12278	29872			1.433			
TOTAL	38173	83285	9622	16258	1.182	9930	11373	9677
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

CANADIAN increase in trade between period 1 and period 3 X' - X	6636	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	1751	26.4
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	-1443	-21.7
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	-253	-3.8
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	6581	99.2

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 4

EUROPEAN ECONOMIC COMMUNITY: Results of Period 1 vs. Period 3.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	908	285	-0.200	-182	1073	-341
MID INC.	11682	38326	1458	5742	2.281	3326	1723	3894
LDC	6780	15453	311	1802	1.279	398	368	1035
CEN PLAN	5516	18155	428	2875	2.291	981	506	2944
TOTAL	38174	83284	3105	10704	1.182	4522	3670	7533
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	0	0	1.032	0	0	0
MEDIUM	12857	26915	0	0	1.093	0	0	0
SOFT	12278	29872	3105	10704	1.433	4449	3670	7533
TOTAL	38173	83285	3105	10704	1.182	4449	3670	7533
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

E.E.C. increase in trade between period 1 and period 3		
X' - X	7599	100%
		%
DUE TO INCREASED WORLD TRADE		
iSsXi-SXi	565	7.4
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	779	10.3
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	3084	40.6
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	3171	41.7

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 5

UNITED STATES: Results of Period 1 vs. Period 3.
-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	3474	5772	-0.200	-696	4106	-704
MID INC.	11682	38326	5638	18400	2.281	12859	6664	12758
LDC	6780	15453	3722	5948	1.279	4761	4399	4101
CEN PLAN	5516	18155	1373	4547	2.291	3146	1623	3664
TOTAL	38174	83284	14207	34667	1.182	20070	16793	19819
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	794	4992	1.032	819	939	891
MEDIUM	12857	26915	8473	16181	1.093	9261	10015	10762
SOFT	12278	29872	4940	13494	1.433	7079	5839	8166
TOTAL	38173	83285	14207	34667	1.182	17159	16793	19819
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

U.S. increase in trade between period 1 and period 3.

X' - X	20460	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	2586	12.6
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	366	1.8
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	2660	13.0
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	14848	72.6

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 6

OTHER EXPORTING NATIONS, Period 1 to Period 3

-000-tonnes

MARKET	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
IND.	14196	11350	1156	198	-0.200	-232	1366	-434
MID INC.	11682	38326	897	2479	2.281	2046	1060	2396
LDC	6780	15453	89	646	1.279	114	105	296
CEN PLAN	5516	18155	2092	2351	2.291	4793	2473	2142
TOTAL	38174	83284	4234	5674	1.182	6721	5005	4401
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
COMMODITY			Xi	X'i	si	siXi	sXi	jSsijXij
HARD	13038	26498	0		1.032	0	0	0
MEDIUM	12857	26915	0		1.093	0	0	0
SOFT	12278	29872	4234	5674	1.433	6067	5005	4401
TOTAL	38173	83285	4234	5674	1.182	6067	5005	4401
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

OTHER increase in trade between period 1 and period 3 X' - X	1440	100%
DUE TO INCREASED WORLD TRADE iSsXj-SXj	771	% 53.5
DUE TO COMMODITY COMPOSITION iSsjXj - SsXj	1062	73.8
DUE TO MARKET DISTRIBUTION iSjSsijXij-iSsjXj	-1666	-115.7
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	1273	88.4

S = summation
iS = summation over all the i's
jS = summation over all the j's

TABLE 7

ARGENTINA: Results of Period 1 vs. Period 3 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	1181	275	-0.2	-236	1396	-228
MID INC.	11682	38326	1246	2025	2.281	2842	1473	2551
LDC	6780	15453	171	669	1.279	219	202	469
CEN PLAN	5516	18155	26	2280	2.291	60	31	107
TOTAL	38174	83284	2624	5249	1.182	2885	3102	2898
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	2624	5249	1.032	2708	3102	2898
MEDIUM	12857	26915			1.093			0
SOFT	12278	29872			1.433			0
TOTAL	38173	83285	2624	5249	1.182	2708	3102	2898
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

ARGENTINE increase in trade between period 1 and period 3 X' - X	2625	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	478.0	% 18.2
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	-217.0	-8.3
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	13.5	0.5
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	2351.0	89.6

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 8

AUSTRALIA: Results of Period 1 vs. Period 3 Calculated with the Effects Reversed

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	1465	1134	-0.2	-293	1732	19
MID INC.	11682	38326	1169	5471	2.281	2666	1382	2440
LDC	6780	15453	1491	2716	1.279	1907	1762	38
CEN PLAN	5516	18155	258	1412	2.291	591	305	800
TOTAL	38174	83284	4383	10733	1.182	4871	5181	3297
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498			1.032			0
MEDIUM	12857	26915	4383	10733	1.093	4791	5181	3297
SOFT	12278	29872			1.433			0
TOTAL	38173	83285	4383	10733	1.182	4791	5181	3297
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

AUST. increase in trade between period 1 and period 3 X' - X	6350	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	798.0	% 12.6
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	-310.0	-4.9
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	-1574.1	-24.8
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	7436.0	117.1

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 9

CANADA: Results of Period 1 vs. Period 3 Calculated with the Effects Reversed

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	6011	3686	-0.2	-1202	7105	-1160
MID INC.	11682	38326	1276	4210	2.281	2911	1508	2612
LDC	6780	15453	995	3672	1.279	1273	1176	2730
CEN PLAN	5516	18155	1340	4690	2.291	3070	1584	5495
TOTAL	38174	83284	9622	16258	1.182	6052	11373	9677
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	9622	16258	1.032	9930	11373	9677
MEDIUM	12857	26915			1.093			
SOFT	12278	29872			1.433			
TOTAL	38173	83285	9622	16258	1.182	9930	11373	9677
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij
CANADIAN increase in trade between period 1 and period 3 X' - X						6636	3333	
DUE TO INCREASED WORLD TRADE jSsXj-SXj						1751.0	% 26.4	
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj						-5321.0	-80.2	
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj						3625.5	54.6	
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij						6581.0	99.2	

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 10

E.E.C.: Results of Period 1 vs. Period 3 Calculated with the Effects Reversed

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	908	285	-0.200	-182	1073	-341
MID INC.	11682	38326	1458	5742	2.281	3326	1723	3894
LDC	6780	15453	311	1802	1.279	398	368	1035
CEN PLAN	5516	18155	428	2875	2.291	981	506	2944
TOTAL	38174	83284	3105	10704	1.182	4522	3670	7533
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	0	0	1.032	0	0	0
MEDIUM	12857	26915	0	0	1.093	0	0	0
SOFT	12278	29872	3105	10704	1.433	4449	3670	7533
TOTAL	38173	83285	3105	10704	1.182	4449	3670	7533
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

E.E.C. increase in trade between period 1 and period 3 X' -X	7599	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	565.1	% 7.4
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	852.3	11.2
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	3010.1	39.6
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	3171.0	41.7

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 11

U.S.A.: Results of Period 1 vs. Period 3 Calculated with the Effects Reversed

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	3474	5772	-0.200	-696	4106	-704
MID INC.	11682	38326	5638	18400	2.281	12859	6664	12758
LDC	6780	15453	3722	5948	1.279	4761	4399	4101
CEN PLAN	5516	18155	1373	4547	2.291	3146	1623	3664
TOTAL	38174	83284	14207	34667	1.182	20070	16793	19819
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	794	4992	1.032	819	939	891
MEDIUM	12857	26915	8473	16181	1.093	9261	10015	10762
SOFT	12278	29872	4940	13494	1.433	7079	5839	8166
TOTAL	38173	83285	14207	34667	1.182	17159	16793	19819
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

U.S. increase in trade between period 1 and period 3 X' - X	20460	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	2586	% 12.64
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	3277	16.02
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	-251	-1.23
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	14848	72.57

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 12

OTHER NATIONS: Results of Period 1 vs. Period 3 Calculated with the Effects Reversed

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 3	(3) PERIOD 1 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	11350	1156	198	-0.200	-232	1366	-434
MID INC.	11682	38326	897	2479	2.281	2046	1060	2396
LDC	6780	15453	89	646	1.279	114	105	296
CEN PLAN	5516	18155	2092	2351	2.291	4793	2473	2142
TOTAL	38174	83284	4234	5674	1.182	6721	5005	4401
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	26498	0		1.032	0	0	0
MEDIUM	12857	26915	0		1.093	0	0	0
SOFT	12278	29872	4234	5674	1.433	6067	5005	4401
TOTAL	38173	83285	4234	5674	1.182	6067	5005	4401
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

OTHER increase in trade between period 1 and period 3 X' - X	1440	100%
DUE TO INCREASED WORLD TRADE		%
jSsXj-SXj	771	53.5
DUE TO COMMODITY COMPOSITION		
jSsjXj - SsXj	1717	119.2
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-jSsjXj	-2321	-161.2
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	1273	88.4

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 13

ARGENTINA: Results of Period 1 vs Period 2.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	1181	605	-0.036	-43	518	-182
MID INC.	11682	21205	1246	1395	0.815	1016	547	835
LDC	6780	11500	171	408	0.696	119	75	407
CEN PLAN	5516	8534	26	302	0.547	14	11	23
TOTAL	38174	54922	2624	2710	0.439	1106	1152	1082
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	2624	2710	0.373	980	1152	1082
MEDIUM	12857	18081			0.406	0		0
SOFT	12278	18936			0.542	0		0
TOTAL	38173	54924	2624	2710	0.439	980	1152	1082
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

ARGENTINE increase in trade between period 1 and period 2 X' - X	86	100%
DUE TO INCREASED WORLD TRADE iSsXi-SXi	-1472	% -1711.7
DUE TO COMMODITY COMPOSITION iSsiXi - SsXi	-172	-200.0
DUE TO MARKET DISTRIBUTION iSjSsijXij-iSsiXi	102	118.9
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	1628	1892.8

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 14

AUSTRALIA: Results of Period 1 vs. Period 2.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	1465	1715	-0.036	-53	643	456
MID INC.	11682	21205	1169	2932	0.815	953	513	872
LDC	6780	11500	1491	2008	0.696	1038	655	164
CEN PLAN	5516	8534	258	309	0.547	141	113	79
TOTAL	38174	54922	4383	6964	0.439	2079	1924	1571
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907			0.373			
MEDIUM	12857	18081	4383	6964	0.406	1779	1924	1571
SOFT	12278	18936			0.542			
TOTAL	38173	54924	4383	6964	0.439	1779	1924	1571
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

AUST. increase in trade between period 1 and period 2 X' - X	2581	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	-2459	-95.3
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	-145	-5.6
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	-208	-8.1
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	5393	209.0

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 15

CANADA: Results of Period 1 vs. Period 2.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	6011	4506	-0.036	-217	2639	-926
MID INC.	11682	21205	1276	1957	0.815	1040	560	855
LDC	6780	11500	995	3241	0.696	693	437	2366
CEN PLAN	5516	8534	1340	2252	0.547	733	588	1166
TOTAL	38174	54922	9622	11956	0.439	2249	4224	3461
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	9622	11956	0.373	3593	4224	3461
MEDIUM	12857	18081			0.406			
SOFT	12278	18936			0.542			
TOTAL	38173	54924	9622	11956	0.439	3593	4224	3461
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

CANADIAN increase in trade between period 1 and period 2 X' - X	2334	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	-5398	-231.3
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	-631	-27.0
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	-132	-5.7
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	8495	364.0

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 16

EUROPEAN ECONOMIC COMMUNITY: Results of Period 1 vs. Period 2.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	908	909	-0.036	-33	399	-57
MID INC.	11682	21205	1458	3226	0.815	1189	640	1457
LDC	6780	11500	311	737	0.696	217	137	277
CEN PLAN	5516	8534	428	572	0.547	234	188	217
TOTAL	38174	54922	3105	5444	0.439	1606	1363	1893
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	0	0	0.373	0	0	0
MEDIUM	12857	18081	0	0	0.406	0	0	0
SOFT	12278	18936	3105	5444	0.542	1684	1363	1893
TOTAL	38173	54924	3105	5444	0.439	1684	1363	1893
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

E.E.C. increase in trade between period 1 and period 2 X' - X	2339	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	-1742	-74.5
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	321	13.7
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	209	8.9
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	3551	151.8

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 17

U.S.A.: Results of Period 1 vs. Period 2.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	3474	5013	-0.036	-126	1525	266
MID INC.	11682	21205	5638	9666	0.815	4596	2475	4612
LDC	6780	11500	3722	4598	0.696	2591	1634	1426
CEN PLAN	5516	8534	1373	1567	0.547	751	603	478
TOTAL	38174	54922	14207	20844	0.439	7813	6237	6782
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	794	3241	0.373	297	349	323
MEDIUM	12857	18081	8473	11116	0.406	3443	3720	3652
SOFT	12278	18936	4940	6487	0.542	2679	2169	2807
TOTAL	38173	54924	14207	20844	0.439	6418	6237	6782
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

U.S.A. increase in trade between period 1 and period 2 X' - X	6637	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	-7970	-120.1
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	181	2.7
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	364	5.5
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	14062	211.9

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 18

OTHER EXPORTING NATIONS: Results of Period 1 vs. Period 2.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	1156	935	-0.036	-42	507	-73
MID INC.	11682	21205	897	2031	0.815	731	394	896
LDC	6780	11500	89	507	0.696	62	39	79
CEN PLAN	5516	8534	2092	3533	0.547	1145	918	1059
TOTAL	38174	54922	4234	7006	0.439	1896	1859	1961
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	0		0.373	0	0	0
MEDIUM	12857	18081	0		0.406	0	0	0
SOFT	12278	18936	4234	7006	0.542	2296	1859	1961
TOTAL	38173	54924	4234	7006	0.439	2296	1859	1961
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

OTHER increase in trade between period 1 and period 2 X' - X	2772	100%
DUE TO INCREASED WORLD TRADE iSsXi-SXi	-2375	% -85.7
DUE TO COMMODITY COMPOSITION iSsiXi - SsXi	437	15.8
DUE TO MARKET DISTRIBUTION iSjSsijXij-iSsiXi	-335	-12.1
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	5045	182.0

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 19

ARGENTINA: Period 1 vs. Period 2 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1	(4) PERIOD 2	(5) (2)/(1)-1	(6) (5)*(3)	(7) s*(3)	(8) iSsijXij
			Xj	X'j	sj	sjXj	sXj	
MARKET								
IND.	14196	13683	1181	605	-0.036	-43	518	-182
MID INC.	11682	21205	1246	1395	0.815	1016	547	835
LDC	6780	11500	171	408	0.696	119	75	407
CEN PLAN	5516	8534	26	302	0.547	14	11	23
TOTAL	38174	54922	2624	2710	0.439	1106	1152	1082
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	2624	2710	0.373	980	1152	1082
MEDIUM	12857	18081			0.406	0		0
SOFT	12278	18936			0.542	0		0
TOTAL	38173	54924	2624	2710	0.439	980	1152	1082
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

ARGENTINE increase in trade between period 1 and period 2 X' - X	86	100%	
DUE TO INCREASED WORLD TRADE jSsXj-SXj	-1472	-1711.7	%
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	-46	-53.0	
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	-24	-28.0	
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	1628	1892.8	

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 20

AUSTRALIA: Results of Period 1 vs. Period 2 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	1465	1715	-0.036	-53	643	456
MID INC.	11682	21205	1169	2932	0.815	953	513	872
LDC	6780	11500	1491	2008	0.696	1038	655	164
CEN PLAN	5516	8534	258	309	0.547	141	113	79
TOTAL	38174	54922	4383	6964	0.439	2079	1924	1571
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907			0.373			
MEDIUM	12857	18081	4383	6964	0.406	1779	1924	1571
SOFT	12278	18936			0.542			
TOTAL	38173	54924	4383	6964	0.439	1779	1924	1571
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

AUSTRALIAN increase in trade between period 1 and period 2 X' - X	2581	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	-2459	% -95.3
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	155	6.0
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	-508	-19.7
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	5393	209.0

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 21

CANADA: Results of Period 1 vs. Period 2 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	6011	4506	-0.036	-217	2639	-926
MID INC.	11682	21205	1276	1957	0.815	1040	560	855
LDC	6780	11500	995	3241	0.696	693	437	2366
CEN PLAN	5516	8534	1340	2252	0.547	733	588	1166
TOTAL	38174	54922	9622	11956	0.439	2249	4224	3461
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	9622	11956	0.373	3593	4224	3461
MEDIUM	12857	18081			0.406			
SOFT	12278	18936			0.542			
TOTAL	38173	54924	9622	11956	0.439	3593	4224	3461
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

CANADIAN increase in trade between period 1 and period 2 X' - X	2334	100%
DUE TO INCREASED WORLD TRADE		%
jSsXj-SXj	-5398	-231.3
DUE TO COMMODITY COMPOSITION		
jSsjXj - SsXj	-1975	-84.6
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-jSsjXj	1212	51.9
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	8495	364.0

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 22

E.E.C.: Results of Period 1 vs. Period 2 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	908	909	-0.036	-33	399	-57
MID INC.	11682	21205	1458	3226	0.815	1189	640	1457
LDC	6780	11500	311	737	0.696	217	137	277
CEN PLAN	5516	8534	428	572	0.547	234	188	217
TOTAL	38174	54922	3105	5444	0.439	1606	1363	1893
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	0	0	0.373	0	0	0
MEDIUM	12857	18081	0	0	0.406	0	0	0
SOFT	12278	18936	3105	5444	0.542	1684	1363	1893
TOTAL	38173	54924	3105	5444	0.439	1684	1363	1893
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

E.E.C. increase in trade between period 1 and period 2 X' - X	2339	100%
DUE TO INCREASED WORLD TRADE		%
jSsXj-SXj	-1742	-74.5
DUE TO COMMODITY COMPOSITION		
jSsjXj - SsXj	243	10.4
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-jSsjXj	286	12.2
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	3551	151.8

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 23

UNITED STATES: Results of Period 1 vs. Period 2 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	3474	5013	-0.036	-126	1525	266
MID INC.	11682	21205	5638	9666	0.815	4596	2475	4612
LDC	6780	11500	3722	4598	0.696	2591	1634	1426
CEN PLAN	5516	8534	1373	1567	0.547	751	603	478
TOTAL	38174	54922	14207	20844	0.439	7813	6237	6782
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	794	3241	0.373	297	349	323
MEDIUM	12857	18081	8473	11116	0.406	3443	3720	3652
SOFT	12278	18936	4940	6487	0.542	2679	2169	2807
TOTAL	38173	54924	14207	20844	0.439	6418	6237	6782
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

U.S. increase in trade between period 1 and period 2 - X' - X	6637	100%
DUE TO INCREASED WORLD TRADE		%
jSsXj-SXj	-7970	-120.1
DUE TO COMMODITY COMPOSITION		
jSsjXj - SsXj	1576	23.7
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-jSsjXj	-1030	-15.5
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	14062	211.9

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 24

OTHER NATIONS: Results of Period 1 vs. Period 2 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 1	(2) PERIOD 2	(3) PERIOD 1 Xj	(4) PERIOD 2 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	14196	13683	1156	935	-0.036	-42	507	-73
MID INC.	11682	21205	897	2031	0.815	731	394	896
LDC	6780	11500	89	507	0.696	62	39	79
CEN PLAN	5516	8534	2092	3533	0.547	1145	918	1059
TOTAL	38174	54922	4234	7006	0.439	1896	1859	1961
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	13038	17907	0		0.373	0	0	0
MEDIUM	12857	18081	0		0.406	0	0	0
SOFT	12278	18936	4234	7006	0.542	2296	1859	1961
TOTAL	38173	54924	4234	7006	0.439	2296	1859	1961
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

OTHER increase in trade between period 1 and period 2	2772	100%
		%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	-2375	-85.7
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	37	1.3
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	65	2.3
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	5045	182.0

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 25

ARGENTINA: Results of Period 2 vs. Period 3.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	605	275	-0.171	-103	312	-28
MID INC.	21205	38326	1395	2025	0.807	1126	720	1149
LDC	11500	15453	408	669	0.344	140	211	44
CEN PLAN	8534	18155	302	2280	1.127	340	156	522
TOTAL	54922	83284	2710	5249	0.516	1504	1398	1687
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	2710	5249	0.480	1300	1398	1687
MEDIUM	18081	26915			0.489	0	0	
SOFT	18936	29872			0.578	0	0	
TOTAL	54924	83285	2710	5249	0.516	1300	1398	1687
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

ARGENTINE increase in trade between period 2 and period 3 X' - X	2539	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	-1312	-51.7
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	-98	-3.9
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	387	15.2
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	3562	140.3

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 26

AUSTRALIA: Results of Period 2 vs. Period 3.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	1715	1134	-0.171	-292	885	-389
MID.INC.	21205	38326	2932	5471	0.807	2367	1513	2252
LDC	11500	15453	2008	2716	0.344	690	1036	-153
CEN PLAN	8534	18155	309	1412	1.127	348	159	661
TOTAL	54922	83284	6964	10733	0.516	3113	3593	2371
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	0	0	0.480	0	0	
MEDIUM	18081	26915	6964	10733	0.489	3402	3593	2371
SOFT	18936	29872	0	0	0.578	0	0	
TOTAL	54924	83285	6964	10733	0.516	3402	3593	2371
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

AUSTRALIAN increase in trade between period 2 and period 3 X' - X	3769	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	-3371	-89.4
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	-191	-5.1
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	-1031	-27.4
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	8362	221.9

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 27

CANADA: Results of Period 2 vs. Period 3.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	4506	3686	-0.171	-768	2325	-212
MID INC.	21205	38326	1957	4210	0.807	1580	1010	1613
LDC	11500	15453	3241	3672	0.344	1114	1672	350
CEN PLAN	8534	18155	2252	4690	1.127	2539	1162	3891
TOTAL	54922	83284	11956	16258	0.516	4465	6169	5642
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	11956	16258	0.480	5736	6169	5642
MEDIUM	18081	26915	0	0	0.489	0	0	0
SOFT	18936	29872	0	0	0.578	0	0	
TOTAL	54924	83285	11956	16258	0.516	5736	6169	5642
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

CANADIAN increase in trade between period 2 and period 3 X' - X	4302	100%
DUE TO INCREASED WORLD TRADE iSsXi-SXi	-5787	% -134.5
DUE TO COMMODITY COMPOSITION iSsiXi - SsXi	-433	-10.1
DUE TO MARKET DISTRIBUTION iSjSsijXij-iSsiXi	-94	-2.2
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	10616	246.8

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 28

E.E.C.: Results of Period 2 vs. Period 3.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	909	285	-0.171	-155	469	-302
MID INC.	21205	38326	3226	5742	0.807	2605	1665	2700
LDC	11500	15453	737	1802	0.344	253	380	950
CEN PLAN	8534	18155	572	2875	1.127	645	295	197
TOTAL	54922	83284	5444	10704	0.516	3348	2809	3545
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	0	0	0.480	0	0	3545
MEDIUM	18081	26915	0	0	0.489	0	0	0
SOFT	18936	29872	5444	10704	0.578	3144	2809	
TOTAL	54924	83285	5444	10704	0.516	3144	2809	3545
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

E.E.C. increase in trade between period 2 and period 3 X' - X	5260	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	-2635	-50.1
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	335	6.4
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	401	7.6
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	7159	136.1

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 29

U.S.A.: Results of Period 2 vs. Period 3.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	5013	5772	-0.171	-855	2587	-1091
MID INC.	21205	38326	9666	18400	0.807	7804	4988	7710
LDC	11500	15453	4598	5948	0.344	1581	-2373	2107
CEN PLAN	8534	18155	1567	4547	1.127	1767	809	3136
TOTAL	54922	83284	20844	34667	0.516	10297	10756	11861
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	3241	4992	0.480	1555	1672	1258
MEDIUM	18081	26915	11116	16181	0.489	5431	5736	6465
SOFT	18936	29872	6487	13494	0.578	3746	3347	4137
TOTAL	54924	83285	20844	34667	0.516	10732	10756	11861
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

U.S.A. increase in trade between period 2 and period 3 X' - X	13823	100%
DUE TO INCREASED WORLD TRADE		%
iSsXi-SXi	-10088	-73.0
DUE TO COMMODITY COMPOSITION		
iSsiXi - SsXi	-23	-0.2
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-iSsiXi	1128	8.2
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	22806	165.0

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 30

OTHER NATIONS: Results of Period 2 vs. Period 3.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11310	935	198	-0.171	-159	482	-209
MID INC.	21205	38316	2031	2479	0.807	1640	1048	419
LDC	11500	15413	507	646	0.344	174	262	35
CEN PLAN	8534	18115	3533	2351	1.127	3983	1823	23
TOTAL	54922	83284	7006	5674	0.516	5638	3615	268
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	0	0	0.480	0	0	0
MEDIUM	18081	26915	0	0	0.489	0	0	0
SOFT	18936	29872	7006	5674	0.578	4046	3615	268
TOTAL	54924	83285	7006	5674	0.516	4046	3615	268
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

OTHER increase in trade between period 2 and period 3 X' - X	-1332	100%
DUE TO INCREASED WORLD TRADE iSsXi-SXi	-3391	% -254.6
DUE TO COMMODITY COMPOSITION iSsiXi - SsXi	431	32.4
DUE TO MARKET DISTRIBUTION iSjSsijXij-iSsiXi	-3778	-283.6
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	5406	405.9

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 31

ARGENTINA: Results of Period 2 vs. Period 3 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	605	275	-0.171	-103	312	-28
MID INC.	21205	38326	1395	2025	0.807	1126	720	1149
LDC	11500	15453	408	669	0.344	140	211	44
CEN PLAN	8534	18155	302	2280	1.127	340	156	522
TOTAL	54922	83284	2710	5249	0.516	1504	1398	1687
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	2710	5249	0.480	1300	1398	1687
MEDIUM	18081	26915			0.489	0	0	
SOFT	18936	29872			0.578	0	0	
TOTAL	54924	83285	2710	5249	0 516	1300	1398	1687
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

ARGENTINE increase in trade between period 2 and period 3 X' - X	2539	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	-1312	% -51.7
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	106	4.2
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	183	7.2
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	3562	140.3

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 32

AUSTRALIA: Results of Period 2 vs. Period 3 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	1715	1134	-0.171	-292	885	-389
MID INC.	21205	38326	2932	5471	0.807	2367	1513	2252
LDC	11500	15453	2008	2716	0.344	690	1036	-153
CEN PLAN	8534	18155	309	1412	1.127	348	159	661
TOTAL	54922	83284	6964	10733	0.516	3113	3593	2371
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	0	0	0.480	0	0	
MEDIUM	18081	26915	6964	10733	0.489	3402	3593	2371
SOFT	18936	29872	0	0	0.578	0	0	
TOTAL	54924	83285	6964	10733	0.516	3402	3593	2371
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

AUST. increase in trade between period 2 and period 3 X' - X	3769	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	-3371	% -89.4
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	-480	-12.7
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	-743	-19.7
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	8362	221.9

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 33

CANADA: Results of Period 2 vs. Period 3 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	4506	3686	-0.171	-768	2325	-212
MID INC.	21205	38326	1957	4210	0.807	1580	1010	1613
LDC	11500	15453	3241	3672	0.344	1114	1672	350
CEN PLAN	8534	18155	2252	4690	1.127	2539	1162	3891
TOTAL	54922	83284	11956	16258	0.516	4465	6169	5642
			iSjSXij	iSjSX'ij.	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	11956	16258	0.480	5736	6169	5642
MEDIUM	18081	26915	0	0	0.489	0	0	0
SOFT	18936	29872	0	0	0.578	0	0	
TOTAL	54924	83285	11956	16258	0.516	5736	6169	5642
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

CANADIAN increase in trade between period 2 and period 3 X' - X	4302	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	-5787	% -134.5
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	-1705	-39.6
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	1178	27.4
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	10616	246.8

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 34

E.E.C.: Results of Period 2 vs. Period 3 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	909	285	-0.171	-155	469	-302
MID INC.	21205	38326	3226	5742	0.807	2605	1665	2700
LDC	11500	15453	737	1802	0.344	253	380	950
CEN PLAN	8534	18155	572	2875	1.127	645	295	197
TOTAL	54922	83284	5444	10704	0.516	3348	2809	3545
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	0	0	0.480	0	0	3545
MEDIUM	18081	26915	0	0	0.489	0	0	0
SOFT	18936	29872	5444	10704	0.578	3144	2809	
TOTAL	54924	83285	5444	10704	0.516	3144	2809	3545
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

E.E.C. increase in trade between period 2 and period 3 X' - X	5260	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	-2635	% -50.1
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	539	10.2
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	197	3.7
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	7159	136.1

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.

TABLE 35

U.S.A.: Results of Period 2 vs. Period 3 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	5013	5772	-0.171	-855	2587	-1091
MID INC.	21205	38326	9666	18400	0.807	7804	4988	7710
LDC	11500	15453	4598	5948	0.344	1581	2373	2107
CEN PLAN	8534	18155	1567	4547	1.127	1767	809	3136
TOTAL	54922	83284	20844	34667	0.516	10297	10756	11861
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	3241	4992	0.480	1555	1672	1258
MEDIUM	18081	26915	11116	16181	0.489	5431	5736	6465
SOFT	18936	29872	6487	13494	0.578	3746	3347	4137
TOTAL	54924	83285	20844	34667	0.516	10732	10756	11861
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

U.S.A. increase in trade between period 2 and period 3 X' - X	13823	100%
DUE TO INCREASED WORLD TRADE		%
jSsXj-SXj	-10088	-73.0
DUE TO COMMODITY COMPOSITION		
jSsjXj - SsXj	-459	-3.3
DUE TO MARKET DISTRIBUTION		
iSjSsijXij-jSsjXj	1564	11.3
DUE TO INCREASED COMPETITIVENESS		
iSjSX'ij-iSjSsijXij	22806	165.0

S - summation
iS - summation over all the commodity categories.
jS - summation over all the importing country groupings.

TABLE 36

OTHER NATIONS: Results of Period 2 vs. Period 3 Calculated with the Effects Reversed.

-000-tonnes

	(1) PERIOD 2	(2) PERIOD 3	(3) PERIOD 2 Xj	(4) PERIOD 3 X'j	(5) (2)/(1)-1 sj	(6) (5)*(3) sjXj	(7) s*(3) sXj	(8) iSsijXij
MARKET								
IND.	13683	11350	935	198	-0.171	-159	482	-209
MID INC.	21205	38326	2031	2479	0.807	1640	1048	419
LDC	11500	15453	507	646	0.344	174	262	35
CEN PLAN	8534	18155	3533	2351	1.127	3983	1823	23
TOTAL	54922	83284	7006	5674	0.516	5638	3615	268
			iSjSXij	iSjSX'ij	s	jSsjXj	jSsXj	iSjSsjXij
			Xi	X'i	si	siXi	sXi	jSsijXij
COMMODITY								
HARD	17907	26498	0	0	0.480	0	0	0
MEDIUM	18081	26915	0	0	0.489	0	0	0
SOFT	18936	29872	7006	5674	0.578	4046	3615	268
TOTAL	54924	83285	7006	5674	0.516	4046	3615	268
			iSjSXij	iSjSX'ij	s	iSsiXi	iSsXi	iSjSsijXij

OTHER increase in trade between period 2 and period 3 X' - X	-1332	100%
DUE TO INCREASED WORLD TRADE jSsXj-SXj	-3391	% -254.6
DUE TO COMMODITY COMPOSITION jSsjXj - SsXj	2023	151.8
DUE TO MARKET DISTRIBUTION iSjSsijXij-jSsjXj	-5369	-403.1
DUE TO INCREASED COMPETITIVENESS iSjSX'ij-iSjSsijXij	5406	405.9

S = summation
iS = summation over all the commodity categories.
jS = summation over all the importing country groupings.